THE SCIENCE AND THE ART OF INDIAN MEDICINE

PUBLISHER'S NOTE

be

record our obligation to Colonel Sir R. N. ›ra, C.I.E., I.M.S. (R) the Chairman of the ·mmittee on Indigenous Systems of Medicine, ·rnment of India (Ministry of Health), for the ·ission given us to have this memorandum on ·ence and Art of Indian Medicine" presented to Committee by Dr. G. Srinivasa Murti, published for sale to the public.

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THE SCIENCE AND THE ART OF INDIAN MEDICINE

(A Memorandum first prepared for the Madras Government Committee on the Indigenous Systems of Medicine and published by them in 1923)

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BY

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"REMEMBER THREE THINGS"

H. E. Sri C. Rajagopalachari, Governor of West Bengal and Governor-General-designate, was given a farewell ovation by members of the Bangiya Ayurveda Mahasabha at Government House, Calcutta, to-day, (17-6-48).

Replying to their address, Mr. Rajagopalachari referred to the "superstition and prejudice even among the modern medical practitioners" and said:

"Truth and Science are one. There can be no competition between truth and truth, but only between truth and error. I would, therefore, entreat you to remember three things, one is to demand and not to oppose high standard of education and equipment and careful selection in admitting students to your colleges for courses in medicine. The other is to include modern scientific knowledge alongside of our traditional Ayurveda in your institutions so that Truth may run in a single course and prejudice and ignorance vanish to the minimum point. Thirdly, scientific research should be encouraged and there should be no opposition but full co-operation in this between the Western doctors and the learned Kabirajas.

—A. P. I. ("The Hindu", 19th June 1948)

CONTENTS

	PAGE
PRELIMINARY	ii
The Thesis	1
SCIENTIFIC METHODOLOGY	4
The Ayurveda, the Siddha and the Unani—Their Mutual Relationship	4
The Essentials of Western Scientific Method	6
Comparison with the Hindu Scientific Method	10
The Limitations of all Scientific Methods	18
Tests of a Valid Hypothesis according to Western and Hindu Scientists	23
Methods of Ayurveda strictly Scientific	25
The Authority of Scriptures	26
"Ayurveda 'Mixes up' Science, Philosophy and Science"	35
Scientific Validity of the Hypothesis of Darshanas	42
PRELIMINARY SCIENTIFIC STUDY IN AYURVEDA	51
The Need to Learn the exact Meaning of Technical Terms	51
The Panchabhuta Theory	52
A Queer Demand	56
Theories of Matter according to Modern Western and Ancient Indian Sciences compared	62

	PAGE
The Genesis of Atoms—The Vedantic View .	68
,, The Samkhya View	71
,, Comparison with the Modern Western View	72
Presentation of Ancient Wisdom in the Language of Modern Science	80
A Note of Warning	84
PHYSIOLOGY AND ANATOMY . .	87
The Thridhatu Siddhanta . . .	87
Functions of the Three Dhatus . .	88
The Gunas	91
Nature of Thridhatus	100
Prakriti (Temperament)	108
Metabolism and the Seven Dhatus . .	111
Prana and Marma . . .	116
Ayurvedic Anatomy . . .	119
ETIOLOGY AND PATHOLOGY . . .	123
Etiology	123
Ayurvedic Etiology	125
Allopathic Etiology	131
Comparison of Ayurvedic and Allopathic Etiology .	133
Nija and Aganthu Causes and Diseases . .	134
Ayurvedic Pathology	135
The Germ Theory of Disease—The Seed and the Soil	136
PHARMACOLOGY	143
Importance of Study	143
Dravya-Rasa-Veerya - Vipaka - Prabhava Pharmacology	144

PAGE

DIAGNOSIS AND TREATMENT 150

" Examination by the Senses and Interrogation ". 150

Ashtasthana Pareeksha—The Eight Special Examinations 152

Nidana Panchakam—Five-fold investigation of Disease 154

TREATMENT 157

Categories of Treatment . . . 157

The General Principles of Treatment—Treatment to be based on accurate Diagnosis and Prognosis . 161

Samsodhana and Samshamana Treatment . 162

Panchakarma or five Methods of Samsodhana Treatment 162

AYURVEDA AS AN ART 165

The Past and the Present . . . 165

Nutrition, Sick-Dieting and Domestic Medicine . 169

Health-Education and Health-Culture . . 172

Is Ayurveda Self-sufficient at present? . . 181

The Short-Range Objective—Transition to the Synthesis of Indian and Western Medicine . 183

The Long-Range or Ultimate Objective—The Synthesis of Indian and Western Medicine into a Unified and Integrated Whole . . 184

The Universal Brotherhood of Healers . . 186

Organisation of Medical Research . . 187

Clinical Research 190

Pharmocological Research . . . 192

Research in latro-Chemistry . . . 193

The Physician of the Future . . . 194

THE THESIS

MANY and varied have been the objections that have been raised, from time to time, against the recognition and encouragement by the State of the indigenous systems of medicine like the Ayurveda, the Siddha and the Unani ; these objections have always been challenged by exponents of these systems as well as by others interested in their promotion ; the resulting controversy has sometimes been mild and sometimes wild ; some of the objections are trivial while others are vital ; and round none has the fire of controversy raged so fiercely as on the central question whether these Indian systems of medicine are scientific or not. The object of this memorandum is to view things from a scientific standpoint and stimulate scientific discussion on a subject which, it is clear, can now be neither ignored nor shelved.

It is perhaps just as well that I state at the very outset the conclusions, which I have formed from such study of the Indian systems as I have been able

to make, so that it may be known beforehand what it is that I am striving to elaborate in this Memorandum. I have studied these systems from the two standpoints from which every system of medicine has to be judged, *viz.*, (1) as a Science and (2) as an Art; and my conclusions may be briefly summed up as under:

(1) *As a Science.*—The Indian systems are undoubtedly scientific; their general principles and theories (both in subjects of preliminary scientific study like Physics, Physiology and the like, as also in the subjects of Medical Science proper, like Pathology, Medicine and so on) are quite rational and scientific.

(2) *As an Art.*—As practised at present, Indian systems are not self-sufficient. If we divide Medical Science broadly into two sections, *viz.*, Medicine and Surgery, the Indian systems are, in the main, self-sufficient and efficient in Medicine, while in Surgery they are not.

In both Science and Art, there are points which Indian and European systems can well learn from each other with immense profit to both; that they may so fraternise and learn is a consummation devoutly to be wished, not only in the best interests of science but also of what is even more important than science itself, *viz.*, suffering humanity.

Such is my thesis, which I now proceed to develop, under the following headings :

(1) Scientific methodology.—Pratyaksha and Anumana.

(2) Subjects of preliminary scientific study—the Panchabhuta Theory.

(3) Physiology and Anatomy—the Thri-dhatu Theory.

(4) Ætiology and Pathology—the Thri-dosha Theory.

(5) Pharmacology—the Rasa-Guna-Veerya-Vipaka-Prabhava Theory.

(6) Diagnosis and treatment—Application of Thridosha Theory.

(7) Indian systems judged from the standpoint of Art.

SCIENTIFIC METHODOLOGY

THE AYURVEDA, THE SIDDHA AND THE UNANI—THEIR MUTUAL RELATIONSHIP

AS stated at the outset, it is round the question whether or not the Indian systems have any scientific methodology at all that there has been a good deal of controversy. If we are to return any precise and definite answer to this question, we must first be clear as to what we exactly mean by "science" and "scientific method"; for, in the past, a good deal of confusion has been caused by failure to settle this preliminary point, and discussions have been carried on with little mutual understanding on the part of the controversialists. Hence it becomes necessary to enquire whether the European and the Indian methods of investigation have any common foundations or criteria of belief, to which both of them can appeal to test the validity of any fact or proposition that is at issue; to this end, I propose first to lay down in broad outlines the essentials

of scientific method as pursued by both the Western and the Hindu scientists, and then proceed to show that both have common foundations and a common platform where both can profitably meet and learn from each other.

Regarding the methodology followed in the Unani system, I regret I cannot speak from first-hand knowledge, for I know neither Arabic nor Persian nor even Urdu, and it would be unwise in so important a matter to rely solely on translations. I have, however, the high authority of the renowned Janab Hakim Ajmal Khan Bahadur of Delhi to say that Arabian medicine was founded on Ayurveda.[1] As regards the Siddha system, its fundamental bases such as the Thri-dhatu Physiology and the Thri-dosha Pathology are common ground between it and Ayurveda. Hence it is submitted that though in the following discussion of the scientific bases and methodology of the Indian systems, it is Ayurveda that is mostly referred to, yet we may take it that, so far as the present topic is concerned, what applies to Ayurveda applies generally to the Siddha and the Unani systems as well.

[1] Vide the publication entitled "The Scheme of the Ayurvedic and Unani Tibbi College, Delhi", and Appendix A attached thereto.

THE ESSENTIALS OF THE WESTERN SCIENTIFIC METHOD

Some people are in the habit of talking of the scientific method as though it were extraordinarily recondite, knowable only to the elect and the very high in intellect. While this is certainly true of the higher reaches of science, yet there is nothing extraordinarily mystic about the general conception of the scientific method which even the novice cannot appreciate if he wants to ; its essential characteristic is a particular intellectual attitude towards any problem that may come up for solution, whether it be a problem in mathematics, physics, economics, æsthetics, education, law, medicine, engineering, state-craft, handicraft, or any other branch of knowledge. Many people in the world may be applying the scientific method in their daily round of duty without their being aware of it. "We may get a good lesson in scientific method from a business man meeting some new practical problem, from a lawyer sifting evidence or from a statesman framing a constructive bill."[1] "The man who classifies facts of any kind whatever, who sees their mutual relations and describes their sequences is applying the scientific method and is

[1] *Introduction to Science*, by Thompson—Home University Library, page 58.

a man of science."[1] What science demands from its votaries is a severe discipline in the habitual use of the keen eye, the sharpened intellect and the trained mind. The all-observing keen eye of the scientist helps him to observe widely, and collect together as many facts as he can gather. This is often a very laborious process. The sharpened intellect, playing upon the facts so gathered, carefully analyses and catalogues them under certain categories. These categories, viewed from a synthetic standpoint, suggest certain generalizations which include all the facts or phenomena so far observed. The trained mind brooding upon these generalizations evolves a hypothesis, or may be, more than one hypothesis, in explanation of, and based on, these observed facts or phenomena. Now, every such hypothesis is merely a claim waiting to be verified ; but the claim may or may not be accepted. Experiments are undertaken to test the validity of these hypotheses. All those which are not verified or found valid by experiments are rejected. That hypothesis alone which is shown by experiment to work best, becomes the accepted theory, which, be it noted, is nothing more than the best working hypothesis, among perhaps

[1] *Grammar of Science* by Karl Pearson (3rd edition), Part I, page 12.

several that may have been advanced; moreover, its acceptance is merely tentative or provisional, contingent not only on the continued occurrence of verificatory phenomena but also on similar non-occurrence of contrary ones; for, there is really no finality in science; and the scientific method is essentially a hypothetical or experimental method of trial and error. "It treats all 'facts' as data to be tested, all 'principles' as working hypothesis to be confirmed, all 'truths' as claims to be verified. All allegations, therefore, must be tested, and are valued according to the scientific consequences to which they lead. In all this, a vivid imagination is a most precious gift provided it is strictly controlled by rigid logic and crucial experimentation. At the outset, therefore, scientific method is content with provisional conclusions that are not greatly trusted; and to the end, it is recognized that the human mind does not respond to the infinite gradations of logical probability, but declares itself satisfied and certain, as soon as the evidence for a belief seems to it adequate. After that, the question is humanly settled unless and until something occurs to reopen it. For there is no absolute *chose jugee* in science."[1] Science then is

[1] Professor Schiller in *Psychic Research Quarterly*—Volume I, pages 12-13.

merely "criticized, systematised and generalized knowledge; that is to say, the student of science takes more pains than the man in the street does to get at the facts; he is not content with sporadic knowledge, but will have as large a body of facts as he can get; he systematizes these data and his inference from them,. and sums up in a generalization or formula. In all this, he observes certain logical processes, certain orders of inference, and we call this, "*the scientific method*".

"Of such modes of inference there are no more than there were in the days of Aristotle, who recognized three: (*a*) from particular to particular (analogical reasoning), (*b*) from particular to general (inductive reasoning), (c) from general to particular (deductive reasoning). Let us take a few examples.

(*a*) "*Analogical Reasoning.*—The geologist tells us the story of the making of the earth and describes what happened millions of years ago, and in many cases he relies on analogical reasoning.

(*b*) "*Inductive Reasoning.*—This is argument from particulars to the universal, and science is full of illustrations. Galileo had smooth inclined planes made and then, by rolling balls down them and measuring the time and squares of descent, he discovered

inductively that the space fallen is always as the square or the time of falling." . . .

"The inductive method may almost be called Baconian; for Bacon was the first to show that the sound way of studying Nature was to work up from particulars to principles. He called his method the 'new instrument'—the Novum Organum. It was founded on the principle that things, which are always present, absent, or varying together, are causally connected.

(c) "*Deductive Reasoning.*—This is argument from the universal to particulars, the kind of inference which enables the long arm of science to reach, back through the ages that are past, and forward into those which are to come. By deductions, Neptune was discovered before it was seen. By deduction, given three good observations of a passing comet, we can predict its return to a night."[1]

COMPARISON WITH THE HINDU SCIENTIFIC METHOD

According to Hindu Methodologists, the process of 'ascertainment of truth' depends on the correct understanding of our sources of valid knowledge

[1] *Introduction to Science*, by Thompson—Home University Library, pages 58-61.

(*i.e.*, pramanas or proofs) which are as follows: (1) Prathyaksha or direct observation and perception, (2) Anumana or logical inferential reasoning of the nature of induction and deduction and (3) Shabda (Apthavachanam) or competent testimony of 'knowers of the Vedas,' or the revealed scripture-generally.

[This is according to the Samkhya school of thought. It is only right to add that the Nyaya (logic) adds a fourth source of valid knowledge, namely, Upamana (or analogy or comparison), while the Mimamsa (exegetics) has two more still, namely, Arthapatthi *and* Abhava (Presumption and Privation); but, I proceed here on the view that the threefold Samkhya division includes, in itself, both the fourfold Nyaya and sixfold Mimamsa divisions.]

If we now compare the inductive (Baconian) and deductive methods of the West with the scientific method of Anumana, as practised by the Hindus, we find a striking similarity; for, what is Anumana? "Anumāna (Inference) is the process of ascertaining, not by perception or direct observation, but through the instrumentality or medium of a mark, that a thing possesses a certain character. Inference is therefore based on the establishment of an invariable concomitance (Vyapti) between the mark and the

character inferred."[1] But how is this Vyapti (or invariable concomitance) to be ascertained? This is done exactly as it is done by Western scientists, that is to say, by means of observations and experiments, thoroughly checked and tested by the canons of strict scientific Logic. "The observation of agreement in presence (Anvaya) as well as agreement in absence (Vyatireka) between two phenomena, with the non-observation of the contrary (Vyabhicharadarshanam) is the foundation of our knowledge of Vyapti. Obviously, mere observation of their agreement in presence and their agreement in absence is no help in the matter. Take a concrete example. The ass is customarily employed to bring the fuel with which fire is lighted. In a hundred cases you have observed the ass among the antecedents of smoke. In a hundred cases you may have observed that when there is no ass there is no smoke. This is no warrant for concluding a relation of cause and effect between an ass and smoke. It may be that you happen to have never observed smoke without an antecedent ass, or an ass without smoke following. Even this is of no avail. It is not agreement (unbroken and uniform though it be) in presence or in absence, or in both,

[1] *The Positive Sciences of the Hindus* by Seal (1915 edition) page 250.

that can settle the matter. There is one and only one way of ascertaining the causal relation. Suppose A with certain accompaniments is found to precede B immediately. Now, if A disappearing, B disappears, even though all other antecedents remain and there is no other change in the case, then and then only can the causal relation be ascertained. But this does not establish the unconditionality of the concomitance which is essential to a Vyapti. We, have, therefore, to examine the cases carefully to see if there is any determining condition (Upadhi, *i.e.*, some hidden or undetected but really operative or indispensable accompaniment) which conditions the relation between the supposed sign or mark (Gamaka) and the supposed signate (thing signified, Gamya) . . . Every one of the accompanying circumstances (of course the likely ones) may be taken successively, and it may be shown that the concomitance continues even when the suspected Upadhi (Shankitopadhi) is absent, and therefore it cannot be the Upadhi. And this is to be fortified by the observation of uniform and interrupted agreement in absence (Vyatireka) between the two concomitant phenomena. In this way, when we have disproved all suspected Upadhis, we conclude by establishing the Vyapti. It is true that we may still go on doubting ; but doubt has a

certain limit for the 'experimenter' and the thinking person (Pareekshaka, Prekshavan). When doubt overthrows the foundation of all rational practice or leads to a stoppage or arrest of all practical activity, it stands *ipso facto* condemned, and must be abandoned. Thus it is that Vyapti is ascertained. In this way we observe innumerable instances of Vyapti. Now, by means of repeated observations of this kind (Bhuyo Darshana) we have established the principle of the Uniformity of Nature (Svabhavapratibandha) and also of causality (Karyakaranabhava) ; and these two principles thus ascertained may be made use of in their turn as the basis of an argumentation or deduction (Tarka, Uha) to confirm a particular Vyapti in a particular case. Tarka or Uha, then, is the verification and vindication of particular inductions by the application of the general principles of Uniformity of Nature and of Causality, principles which are themselves based on repeated observation and the ascertainment of innumerable particular inductions of uniformity or causality. Thus Tarka also helps in dispelling doubt."[1] Students of Western scientific methods cannot fail to notice the close resemblance between the above methods and those designated by

[1] *The Positive Sciences of the Hindus*, by Seal (1915 edition), pages 256-57, 276-77.

Mill as 'The Joint Method' and 'The Method of Residues'; if, further, we consider also Mill's 'Methods of Concomitant Variations' and compare the Western Method with what the Hindus call the 'Panchakarni', the resemblances become even more striking; the Panchakarani is illustrated thus: "The following changes being observed, everything else remaining constant, the relation of cause and effect is rigorously established. First step—the 'cause' and the 'effect' phenomena are both unperceived. Second step—then the 'cause' phenomenon is perceived. Third step—then, in immediate succession, the 'effect' 'phenomenon' is perceived. Fourth step—then the 'cause' phenomenon is sublated or disappears. Fifth step—then, in immediate succession, the 'effect' phenomenon disappears. Throughout, of course, it is assumed that the other circumstances remain the same (at least the relevant or material circumstances)."[1] The student of the Physical Sciences cannot fail to notice its general resemblance to the Baconian inductive principle that, if things are, in experience, found to be present, absent or varying together, they are, in all probability, causally connected; only, what

[1] *The Positive Sciences of the Hindus*, by Seal (1915 edition), pages 258-59.

the one following Mill, would call 'the Law of Agreement, difference and concomitant variation,' the other would call the Panchakarani, because the conclusion is reached by Pancha (or five) steps. "This Panchakarani, the Joint Method of difference, has some advantages over J. S. Mill's method of difference, or what is identical therewith, the earlier Buddhist Method; and the form of the canon, bringing out in prominent relief the unconditionality and the immediateness of the antecedence, is as superior from a theoretical point of view to J. S. Mill's canon, and is as much more consonant than the latter, to the practice of every experimenter, as the Hindu analysis of Anumana as a Formal-Material Deductive-Inductive inference is more comprehensive and more scientific than Aristotle's or Mill's Analysis of the Syllogism (or mediate inference); for the Hindu inference (Anumana) is neither merely formal nor merely material, but a combined Formal-Material Deductive-Inductive process. It is neither the Aristotelian Syllogism (Formal-Deductive process), nor Mill's Induction (Material-Inductive process), but the real inference which must combine formal validity with material truth, inductive generalization with Deductive particularization." [1] Such then

[1] *The Positive Sciences of the Hindus*, by Seal pages 290-1.

is the Hindu scientific method. I see much of common ground between the two systems of scientific methodology. The Hindu method of Pratyaksha (or direct perception) has its analogue in the observational method of our Western brethren ; so too, as has been discussed before, the method of Anumana has its analogue in the Western methods of Logical Inferential Reasoning of the Nature of Analogy, Deduction and Induction (Baconian Method). He who goes through the works of the master-minds among both Eastern and Western scientists finds that there is a striking resemblance in their intellectual attitude towards problems that presented themselves before them ; it is an attitude characterized by accurate observation (Darshana and Bhuyodarshana), precise description, correct classification, patient experimentation (Pareeksha), rigid reasoning (Yukti Yuktam), careful verification (Nirnaya), institution, where necessary, of crucial tests (Vinigamaka), and, above all, that supreme faculty of analytico-synthetical imagination (Buddhi) that can see the one connecting law running through the whole range of a mass of apparently unconnected phenomena and enable the Newtons of all times to take their gigantic leaps 'from the falling apple to the falling moon.' "An isolated fact," says Henri Poincare, "can be observed by

all eyes—by those of the ordinary person as well as of the wise. But it is the true physicist alone who may see the bond which unites several facts among which the relationship is made, though obscure. The story of Newton's apple is probably not true. But it is symbolical. So, let us think of it as true. Well, we must believe that many before Newton had seen apples fall, but they made no deduction. Facts are sterile until there are minds capable of choosing between them and discerning those which conceal something and recognizing that which is concealed—minds which, under the bare fact, see the 'soul' of the fact." Now the methods by which thinkers, both in the East and in the West, have tried to see, 'under the bare fact, the soul of the fact' are fundamentally similar, although one calls it by the name of Anumana, while the other labels it as the method of Deduction and Induction (Baconian); that is only a difference in name—not in essence.

THE LIMITATIONS OF ALL SCIENTIFIC METHODS

Then again there is fundamental agreement as regards the essential limitations of these scientific methods; both agree that Prathyaksha (or direct observations and appearances) frequently deceive us. The use of such a term like the 'ultra-microscopic',

for example, must remind us that the range of our senses is distinctly limited, even when aided by instruments of marvellous power and precision. We have 'light' whose brightness is too high for the range of perception of our eye. So in the midst of the most intense 'light', we may be in utter darkness. We have 'sounds' whose vibrations are beyond the range of perception of our ear; and so, in the midst of the most powerful 'sounds' we may be stone-deaf. It is therefore a well-recognized fact, both in the East and the West, that, for the ascertainment of truth, direct perception does not take us very far. Hence, people have everywhere turned to experimental and hypothetical methods of logical inferential reasoning, with a view to add to, or correct the knowledge gained by, direct perception. Thus, the sense-impressions regarding the fixity of the earth and the movement of the sun round it are corrected by an elaborate process of reasoning which leads to the conclusion that it is really the sun that is relatively fixed and the earth that moves round it; so too, the very familiar optical illusions of our every-day life, such as the apparent increase in the size of the sun and the moon when at the horizon than when at the zenith, the apparent rising and setting of the stars, and such other phenomena, are other instances of

how the senses deceive us, and how often things are not really what they seem. Both are also agreed that all the three scientific methods so far discussed, *viz.*, Analogy, Induction and Deduction are themselves not free from possible errors. The method of analogy that has done so much to illumine many dark abysses, specially in Geology and Biology, may be vitiated by some vital differences between the two sets of conditions compared. "Logical inferential reasoning, in both its aspects (induction and deduction) can never get rid of doubt as to the absolute truth and soundness of its conclusions, as the late Lord Balfour showed in his *Defence of Philosophical Doubt*. Deduction depends on the validity of its premises, axioms, and postulates, and on the perfect subtleness and strength of the reasoning powers. Induction, unless we have an infinite number of facts and an infinite mental capacity to comprehend all such facts, cannot also give us the exact truth. An inductive conclusion, though based on a million instances, becomes wrong if one single instance to the contrary is clearly proved to exist, and a higher law which would explain and include the single contrary instance also has to be searched for."

It is essential that these limitations of the scientific method must be specially emphasized, as extravagant

expectations still continue to be entertained regarding its possible achievements; and that, not only by the public at large, but, as was pointed out by Prof. Schiller, by professed logicians also. "The public still believes", he says, "that mathematical demonstration is the *ne plus ultra* of cogency, though modern mathematicians are under no such illusion. They understand that it has only the hypothetical certainty of a coherent system of assumptions and the practical value of a well-chosen one".[1] Different minds are differently constituted, some being influenced more by the first of these two considerations, while others are more influenced by the second. To some people—the Pragmatists, for example—the most satisfactory testimony for truth is not so much its logical consistency, as its utility and practical application to reality. 'Truth is what works' is their great manthram. To some minds, however, the most satisfactory testimony for truth is its logical consistency; they accept that proposition as the best, which, to them, has the logical certainty of a coherent system of assumptions. This will perhaps explain in some measure why, ever since the dawn of history, there have been sects in medicine as in every other science and there have been bitter quarrels among

[1] *Psychic Research Quarterly*, Volume I, page 9.

them. "The quarrels of doctors", says Osler, "make a pretty chapter in the history of medicine. Each generation seems to have had its own. The Coans and the Cnidians, the Arabians and the Galenists, the Brunonians and Broussonians, the Homeopaths and the Regulars, have in different centuries rent the robe of Æsculapius." Can we not do better than add one more quarrel to this dismal list? Wherever knowledge is imperfect, as it undoubtedly is in medicine, differences of views are inevitable. But they need not result in unworthy disputations among those whose one common aim is the eternal quest of truth. We have seen how strong the resemblances are between the modern Western scientific methods based on Baconian Induction and Deduction, and the ancient Hindu methods of Pratyaksha and Anumana, such as Vyaptigraha and Panchakarani; we have also seen that both agree in their recognition of the essential limitations of the scientific method, and in thinking that, not only the senses and the intellect may deceive us, but that even reasoning may lead us astray; for, given a sufficiently robust will-to-believe, one can always find reasons to continue to believe what he wants to believe, unaffected by any reasoning; faced thus with the problem of judging and choosing rightly, among a number of contending

alternatives or hypotheses, both have come to very nearly the same conclusion and it is this.—There is no finality either about our premises or our conclusions; all that we can do is to test each hypothesis with the greatest possible care and accept that which explains best and works best, or explains better or works better, than any other. Hence it is that, both in the East and in the West, the tests of a valid hypothesis are extremely rigid and stringent. To illustrate my point, I cannot perhaps do better than compare the various tests of a valid hypothesis as laid down by both Western and Eastern Scientists.

TESTS OF A VALID HYPOTHESIS ACCORDING TO WESTERN AND HINDU SCIENTISTS

The tests are as under:—" A good hypothesis must allow of the application of deductive reasoning and the inference of consequences capable of comparison with the results of observation. A good hypothesis must not conflict with any laws of nature which we hold to be true. In a good hypothesis, the consequences inferred must agree with the facts of observation. It often happens that two (or even more) hypotheses have been put forward in possible explanation of phenomena, and owing, perhaps, to

both agreeing with a large number of experimental facts, it may be exceedingly difficult to choose between them. Obviously, both cannot be correct; both may be wrong; one must be wrong. How are we to decide? We require a new experiment which shall give results agreeing with one hypothesis, but not with the other. Such an experiment which decides between two rival hypotheses is called an *Experimentum Crucis*. A crucial experiment confirms one hypothesis, but rejects the other." (*Scientific Method* by Professor Westaway, pages 245-246.) Compare the close agreement between this and the tests of a legitimate hypothesis (Kalpana) as laid down by Hindu Scientists :—" A legitimate hypothesis must satisfy the following conditions :—(1) the hypothesis must explain the facts; (2) the hypothesis must not be in conflict with any observed facts or established generalizations (Jayanta, Jayamanjari, Ahnika I); (3) no unobserved agent must be assumed where it is possible to explain the facts satisfactorily by observed agencies (*Ibid.*); (4) when two rival hypotheses are in the field, a crucial fact or test (Vinigamaka, ratio sufficiens) is necessary; the absence of such a test is fatal to the establishment of either; (5) of two rival hypotheses, the simpler, *i.e.*, that which assumes less, is to be preferred, *ceteris paribus* (Kalpanalaghava

versus Kalpanagowrava) ; (6) of two rival hypotheses, that which is immediate or relevant to the subject-matter is to be preferred to that which is alien or remote ; (7) a hypothesis that satisfies the above conditions must be capable of verification (Nirnaya) before it can be established as a theory."[1]

METHODS OF AYURVEDA, STRICTLY SCIENTIFIC

It is as a result of such comparative study as I have attempted to indicate above, that I find myself in a position to give my whole-hearted assent to the opinion of that erudite scholar, Brajendranath Seal, who, in his monumental work *The Positive Sciences of the Ancient Hindus* expresses himself thus, in respect of the question under discussion :—" What is characteristic of the Hindu scientific mind is that, without being content with the general concepts of Science and a general methodology, it elaborated the fundamental categories and concepts of such of the special sciences as it cultivated with assiduity, and systematically adapted the general principles of scientific method to the requirements of the subject-matter in each case. The most signal example of applied logic (or scientific method) worked out with systematic

[1] *Positive Sciences of the Hindus*, by B. N. Seal, page 288.

carefulness is the Logic of Therapeutics in Charaka, a Logic which adapts the general concepts of cause, effect, energy, operation, etc., and the general methodology of science to the special problems presented in the study of diseases, their causes, symptoms and remedies."

THE AUTHORITY OF SCRIPTURES

It is objected that "though the ancient system reached the height of a systematizing, theorizing school of thought, it lacked the freedom of individual action, essential to the pursuit of real science, and its evolution was prematurely arrested by an unscientific veneration for petrified dogmas."[1] No one who has not entered into the very soul of Hindu thought can appreciate what scriptural authority really means to the Hindu, and how two persons, paying the profoundest possible veneration to the same scriptural texts can yet interpret them in ways as diverse as the poles ; a classical example that readily occurs to my mind is how all schools of Vedanta—from uncompromising duality (Dwaita) to absolute non-duality (Adwaita) purport to be based on the same Vedic

[1] *Report of the Calcutta University Commission*—Vol. V, pages 57-58.

texts. The fact of the matter seems to me to be that, alike in Hindu Science, Philosophy and Religion, the amount of freedom of individual action and thought was practically unrestricted, in spite of the theoretical finality of scriptural 'authority'; true, the Vedas were venerated by all as of paramount authority; but, they denoted the eternal wisdom behind the texts than the spoken or written texts themselves, which were but the symbols for conveying that wisdom to human minds; hence, the nature and extent of the knowledge conveyed by the texts to any individual, depended upon the receptive capacity of the individual himself, just as, by one and the same piece of poetry or music, one individual may be sent to profound sleep, and another to ecstatic rapture. So it was that the Vedic texts conveyed different philosophical messages to different types of individual minds; in some, the chord of Samkhya was struck, in others, that of Yoga, and in yet others, that of Vedanta, and so on. So too in Religion the same texts serve as the one common Gospel of those diverse religious faiths that are all included in that one all-embracing Religion known as Hinduism; Science too is no exception to this rule; here, as elsewhere, that same symbol of Eternal Truth, variously called the Vedas, the Agamas, etc., is laid down as

the final court of appeal ; the atomic theory of the Visheshika may differ from that of the Vedantin ; but, each is an attempt—and a perfectly legitimate attempt—to interpret Truth exactly as each sees it ; and who knows that all apparently different views are not merely so many different aspects, each true from its own angle of vision, and each contributing its own complement to the composite picture of Reality, much as certain microscopic individuals confined to the region of one or other of the spectral rays refracted by a prism may truly describe the parent ray, as each sees it, as red, blue, yellow, etc., while Reality is all this and much more ? However this may be, Vedas, to the Hindu, means the Eternal Truth ; and loyalty to the Vedas no more restricts the freedom of action and thought of the Hindu thinkers than loyalty to Truth restricts the similar freedom of others. Whenever a thinker feels that the interpretation given by another to Vedic text is not correct or is opposed to experience, he does not in the least hesitate to say so ; as a matter of fact, with some thinkers, such opportunities of demolishing another's view are never lost ; and the demolition is done with such an obvious relish and piquant zest as to make it appear as though this was a pleasant pastime, loved for its own sake. Of

course, no orthodox pandit would admit that the Vedas could be in error, any more than any one else could admit that truth was in error; all that he claimed to do was that previous commentaries and interpretations of the texts were wrong and that his commentary was more in conformity with the truth of the texts than any other; in other words, differences of views were expressed through commentaries of the texts and not by altering the texts themselves. Considering how easy it was for every dissentient voice to quote scriptures in its support, it does not appear to me that the tacit recognition of the scriptures as the Eternal Truth has hampered the freedom of action and thought, among Hindu thinkers; to them, 'the authority of Scriptures' holds, more or less the same position as 'Truth' to others; when the latter differ among themselves, they do so in the name of that one and the same 'Truth' the quest of which is the common goal of all. The case is very similar with Hindu thinkers; when they differ, as they frequently do, all appeal to and speak in the name of one and the same supreme authority, *viz.*, 'Scriptural knowledge', which, to them, is the same as Eternal Truth. The differences arise because Hindu thinkers differ in their interpretation of 'Scriptural knowledge' just as much as, or even more than, Western

thinkers, in their interpretation of 'Truth' or 'Reality'.

Considered in this light, it is easy to see that what the Hindus call 'Shabda Pramanam' is worlds apart from any blind 'Veneration for petrified dogmas'. Veneration, undoubtedly there is, and in abundance; but, it is for the *words* of *Apthas* or Masters of Wisdom and not for the dogmas of others—much the same sort of veneration that a tyro in Physics cannot help showing to the authority of such a master as a Bose or a Thomson or a Raman. The previous records of these master-minds in contacting and sensing Truth are so rich and ours so poor, that we willingly accept their guidance; and it is well that we do so; it is well that reverence for wisdom should ever dwell in us, and grow from more to more, as more and more of knowledge is vouchsafed to us. It seems to me that the strong objections which Western Scientists have held against the Hindu Shabda Praman is due to its being the subject of a very unfortunate mistranslation as 'authority'. Now, the word 'authority' to Western minds is an anathema; to them, it is reminiscent of that dark period when 'authority' would accuse even a Pope of having commerce with the devil if he ventured to use a novel instrument like the compass. In their

minds, 'authority' conjures up visions of those days when the sterilizing torch of 'authority' sought to burn away the tender seed of Science which Galileo planted at the risk of his life; and naturally enough, when they talk of 'authority', it is as though it were in eternal conflict with what we call 'Reason'. The sort of 'authority' that is depicted here is poles apart from the sort of 'authority' which the Hindu Shabda Praman denotes. Nowhere perhaps is the tyranny of mistranslations more in evidence than in such cases where a word denoting a willing acquiescence in the authority of the words of those experts who are masters of knowledge and wisdom, is construed to mean an unmeaning 'veneration for petrified dogmas'. Here in India, notwithstanding the homage universally paid to 'scriptural authority', differences of views have widely prevailed and been freely discussed. Nobody ever thought that if the great Shankaracharya disagreed, as he did, with the view of Evolution as propounded by the sage Kanada, he, thereby, set at naught the Shabda Pramanam; nor did it prevent the Acharyas Shree Ramanuja or Shree Madhwa from propounding their doctrine of Vishistadwaitam (qualified non-duality) and Dwaitam (duality), as against the view of Shree Shankaracharya himself. Indeed, I do not know if there is any other

people in the world among whom freedom of thought has been more tolerated, fostered and respected than among the Hindus. We are told that in the great ancient Indian University of Benares, the very home, if there was one, of orthodox theism, students and teachers alike, were at perfect liberty to discuss and propound, as indeed they sometimes did, even atheistic doctrines like those of the Charvakas. Even in comparatively recent times as that of the great Adwaitin Madhwacharya, we find that in his discussion of the sixteen religio-philosophical faiths of his time, Charvaka Darshana (Atheism) has a chapter devoted solely to it, equally with Buddhism, Jainism and his own philosophy of Adwaitism. Here, in India, the binding force of Shabda Praman or 'authority' is all from within; none else compels. Here is no 'blind' veneration forced from without, but merely a willing recognition of inevitable fact that where we are dealing in the domain of experts, those who are not 'experts' have perforce to recognize the authority of those who are. Here is no conflict of 'reason' and 'authority', although some people have needlessly distressed themselves over such a bogey. It is not that the 'experts' have arrived at their conclusions, without adducing reasons for the same; for reason is there and always; but it

is too recondite to be understood by non-experts. For instance, how many of us can understand the chain of reasoning adduced by Einstein to build up his Theory of Relativity? Any expert Physicist can accept it or reject it, and state his reasons for doing so; but I can only accept the 'authority' of either Einstein or his opponent, till I become myself an expert capable of reasoning on these topics; but, even here, I have to use my reason for accepting one or other of these experts as my 'authority'; and what guarantee is there that my reasoning is always right reasoning? I may have confounded my prejudice for 'Reason' and accepted the 'Authority' of that expert to whom I had some partiality but who was really in the wrong. If only we recognize that 'authority' does not always mean 'perfect authority', just as 'reasoning' cannot always be equated to 'right reasoning' there will be no difficulty in understanding and appreciating the role played by Shabda Pramanam (or the authority of the words of the wise) in Hindu Scientific and Philosophic thought. All that it says is that, in the region of expert knowledge, those who are novices have to accept the 'authority' of those who are experts. While this undoubtedly acts as a wholesome and conservative check against ignorant and upstart tyros flooding the world with

their immature views, it, in no way, restricts the growth of independent thought, nor does it prevent experts from differing from one another, if they find cause to do so; as a matter of fact, the course of Hindu thought abounds in numerous instances of 'authority' differing from 'authority'. In both *Charaka* and *Sushruta*, the two classical works of Ayurveda, there are many examples of such differences of views, propounded with rare acumen and felicity of expression, and discussed in thoroughly scientific style; and Ayurveda, having long ago reached, as the Calcutta University Commissioners truly observe, "the height of a systematizing and theorizing school of thought" still holds a unique position as a system of strictly logical and scientific thinking. That its evolution, more especially on the practical side, was prematurely arrested", is no doubt true; but, to attribute it to "an unscientific veneration for petrified dogmas" is, in my humble opinion, to reverse the role of cause and effect. "Unscientific veneration for petrified dogmas" has undoubtedly existed among some later day Pundits; but, that is the *result, not the cause*, of arrested evolution and progress which has, in the recent past, overtaken not only Ayurveda but ancient Indian thought generally. When decay of learning sets in, the great

masters capable of scientifically expounding their doctrines become few and far between; and followers, imbued with more reverence for their masters than learning in their teachings are apt to make dogmas out of the doctrines propounded by their masters. For causes however—political and other—of this general decay of Indian Learning and Arts, we must look deep into the records of history.

"AYURVEDA 'MIXES UP' SCIENCE, PHILOSOPHY AND RELIGION"

Another objection which critics raise against Ayurveda is something to this effect; the sources of Ayurveda are scattered among such works of Philosophy as the Nyaya and Samkhya Darshanas, and such works of Religion as the Vedas, Puranas and Itihasas; this mixing up of Science with Philosophy and Religion is unscientific. Now, this charge is quite true; in Ayurveda, as in Hindu thought generally, these several branches of study are ever associated with one another; but, when we go to the root of the matter, is it really possible to isolate and shut them off in water-tight compartments? Has not the Hindu view found its supporters among some of the foremost of Western Scientists themselves?

Karl Pearson is a name to conjure with, in the field of modern Western Science ; yet, we find him expressing himself thus : "The scope of science is to ascertain the truth in every possible branch of knowledge ; there is no sphere of inquiry which lies outside the legitimate field of Science. *To draw a distinction between Science and Philosophy is obscurantism.*"[1] Strong language this ; but none too strong, considering the fact that the notion of confining Science, Philosophy and Religion in isolated, water-tight compartments is still the fashion of the day. I quote Karl Pearson merely to show that the idea of viewing Science, Philosophy and Religion—in fact all branches of knowledge—as one connected whole instead of as so many dissociated entities is not altogether foreign to Western thought. In Ayurveda, however, as in Indian thought generally, such a notion is almost an axiomatic proposition accepted by everybody as a matter of course ; if we are to understand Ayurveda as Ayurvedists know it, (and such an understanding is necessary for every would-be critic), we must equip ourselves at least with a general idea of their fundamental conceptions such as the one we are now considering.

Since this note was written over quarter of a century ago, much has happened in Modern Science

[1] *Grammar of Science*, third edition, Volume I, page 37.

that has made some of its leading lights recognize that it is not possible to keep Physics, Metaphysics and Philosophy in water-tight compartments as they did before and to intersperse or conclude their contributions and books on the Physical and Biological Sciences with open and direct references to Metaphysical, Philosophical and Religious topics. A citation from a leading Indian Scientist in India may be sufficient to serve as an example. At the opening ceremony of a Research Institute in Northern India on 19th April 1946, Sir Shanti Swarup Bhatnagar is reported to have stated as follows: "I am particularly happy that he (Dr. Abdul Ahad, the Director of the Research Institute) has quoted in his speech these last words in a recent broadcast of mine on the subject of Scientist's Utopia. 'It looks certain that, in the Utopia of Scientists, God and Science will be brought into a fertile Union in which the idea of God, instead of being diluted, will be enriched.' This is my conviction and also the belief of a great many top-rank Scientists of the world. The Scientist of to-day is not the hot-headed, blasphemous and conceited fellow which he used to be sometime ago. Physics has merged into Metaphysics. The pride of the Scientists has been humbled to such an extent that he no longer contends that Science can explain

even all that meets the eye." One reason why many students of Modern Science even in India still tend to keep Science, Metaphysics, Philosophy and Religion in water-tight compartments may perhaps be due to the fact that, under the present system of Education in India, every one who has a Science Degree is not necessarily a Scientist as is well brought out in the following Review (that has appeared in the current issue of *The New Review of Calcutta*) relating to a recent publication entitled, "*The Impact and Value of Science*:

"This is a case for Science convincingly put. Seven neat essays, all showing how such fundamental activities of man as Industry, Politics, War, Education, Religion and Leadership, can be effectively and more successfully conducted under the aegis of Science. The motif throughout is that the scientific mind being of a 'ranging, imaginative and a disciplined' type, is best suited to guide the destinies of man. The scientist is mentally mature. Science however is not technology. It is a system of thought, a philosophy and a guide to maturity. It is a living thing of joy and beauty intimately interwoven with the affairs of life and yet distinct from them. Again, *everyone that has a science degree is not a scientist.* [Italics mine]. The way our science graduates are turned out is

far from being the right way of producing minds that have inculcated in them the principles of scientific methodology. Objectivity of outlook, restraint in judgment, imagination and the ability to think clearly and culturally, is not the mark of what we ordinarily call a 'Scientist'. A scientist, *comme il faut*, besides the acquisition of the scientific methods should have a humanistic background which will broaden his outlook and deepen his personality. One would suggest to the educationist that, living as we are in a scientific age, and cognizant of the methods of science, science teaching should be, from an early stage, an important feature of our education. Genuine scientific habits, which imply all that is true and beautiful in the human mind, acquired from youth, will be carried into life and leaven all activities. They can be carried into economics, politics and above all stabilize the tottering minds of the world's leaders."

Whatever may be the view of the average possessor of a Science Degree, the notion of the intimate association of Philosophy, Religion and Science is almost an axiomatic proposition in Hindu thought and meets us at every turn. To understand this position, we must first realize that, to the Hindu, 'Philosophy' was not a matter for mere speculation or intellectual edification; from his standpoint, no subject of inquiry was

worthy of study, unless it helped the student to so regulate his life as to lead him to that state of perfection called Moksha. The modern Western conception of Philosophy as a pure speculative, theoretical study dissociated, as it were, from the actual problems of life had no place in his scheme of life; his justification of philosophy was not merely its excellence as a theory or speculation, but its intense practical value in regulating one's daily life; in other words, the great value to him of philosophy was that it served as the basis of certain ethical rules and physical practices, broadly included under the term 'Religion,' although modern Westerners would label some portions of it as 'Ethics' and others as 'Science'. It may perhaps be better, if I illustrated this point by an example; in that well-known work, *Sarva Darshana Sangraha*, written by the learned Philosopher-Premier Madhawacharya, there is a discussion of the tenets of some sixteen religio-philosophical faiths of India, each discussion occupying a chapter. Here one finds that, along with Buddhism, Jainism, Dwaitism, Adwaitism Vishistadwaitism, etc., there is specific mention of Raseshvara Darshanam (Chemistry) discussed in a chapter all by itself. To the modern Westerner, this is mixing up Science with Philosophy and Religion; but, see what it means to the Hindu;

he argues thus: the one supreme object of Life (or Purushartham) is to attain that state of perfection known as Self-Realization or Mukti, thus freeing oneself from the wheel of births and deaths; now, the study of chemistry helps me to achieve this object, by intelligently using mercury and other chemicals in the healthy dietic and other regulations of my physical and other bodies; here we see at once how the philosophy (if we may say so) of Chemistry is indissolubly associated with the Science of Chemistry, and with certain ethical and physical practices, broadly included under the name of 'Religion'—the 'Religion', if you please, of Chemistry (Raseshavara Darshana). As in Chemistry, so it is in Mathematics, Grammar, Exegetics, Ayurveda or any other branch of study; the philosophical aspect of every one of these is intimately and indissolubly associated with the appropriate scientific and religious aspects. Take, for example, a system like the Yoga of Patanjali; it has (or rather is) a philosophy based on that of the Samkhya, but with the addition of the conception of Ishwara; it is also a Religious discipline, teaching the aspirant to achieve Self-Realization through the eight-fold method of Yoga, which includes the due observance of certain ethical rules and physical practices; then again, it is also a Science

—pre-eminently, the science of psychology, because its religious discipline is largely concerned with the control of the modifications of the mind. Thus it is that every system of Indian thought is not merely a philosophy to be intellectually appreciated, not merely a science for explaining the facts of experience, but is also a Religion to be lived and not merely believed—so direct and immediate is its bearing on the life that is to be lived and the discipline that is to be practised ; in other words, every system of Hindu thought is at once Philosophy, Science and Religion, all in one and one in all. Considered in this light, it may not be so difficult to understand why Ayurveda draws so freely from Samkhya and other Darshanas, which the Westerners classify as 'the Philosophies,' as also from Tantras and other works, which they would designate as distinctly 'Religious' treatises. It may perhaps be better if I illustrated the need and the validity of such borrowings by a reference to the similar borrowings of modern Western Medicine.

SCIENTIFIC VALIDITY OF THE HYPOTHESES OF THE DARSHANAS

We are all aware that in the curriculum of studies of modern Western Medicine, there is always a

provision made for what is sometimes known as 'preliminary scientific study'; a working knowledge of the Laws of Physics, Chemistry and the like is demanded of every student who applies for training in Western Medicine. This preliminary study serves at least a two-fold purpose; firstly, it is calculated to give him a training in scientific method and to engender in him that particular intellectual attitude known as 'the scientific frame of mind'; secondly, it will help the student in understanding many things in medicine, the reasoning of which it would be difficult for him to follow without such preliminary study; for, text-books and teachers of medicine tacitly assume and apply many of the Laws of Physics, Chemistry, etc., without attempting to prove them; hence a preliminary working-knowledge of the Laws of Physics, Chemistry, Biology and the like is laid down as essential for every student of modern Western Medicine. Exactly similar is the position held by the Nyaya, the Visheshika, the Samkhya and other Darshanas, in respect of Ayurveda. If Western Medicine finds it necessary to assume tacitly the theories propounded by our Physicists regarding, say, the constitution of the atom and the molecule, Ayurveda finds it equally necessary to assume the formulæ governing the evolution of the atom as

laid down by, say, the Samkhyas. The assumption in either case is quite legitimate and scientific. I am aware that it is sometimes argued that if the claim of Ayurveda to be a science is to be admitted, it must cease to talk in terms of Nyaya, Samkhya and the like; scientific orthodoxy could go no further. It is as if the Ayurvedists said that if Western Medicine is to be reckoned as a Science it must cease to talk in terms of those 'narrow' conceptions (narrow from their standpoint) which Modern Physics, Chemistry, etc., propound; this attitude is just as unscientific as the other. In so imperfect a science like Medicine, where so many theories have had their little day and ceased to be and are soon replaced by others yet newer, or may be, older ones in a newer garb, who shall say this alone is true, and that other is false? Let us, for one moment, transport ourselves in thought to the days when we were many years younger, say, to the days when the Daltonian notion of the indivisible chemical atom prevailed among Western Scientists. Let us also imagine that a Hindu Samkhya or Visheshika philosopher, working side by side with us, told us that the chemical atom, far from being indivisible, was really very much divisible, enclosing within itself systems within systems, and took us through the whole range of his

evolutionary chain, from the Trasarenu to Dvanukas, Arambhaka Paramanu, and so on, back and back, to Tanmatras, Bhutadi and Mula-Prakriti. What should be our attitude, as students of Science, to our Hindu Samkhya Scientist? Shall we say to him that our scientific speculation holds that an atom is indivisible and therefore his speculation, which holds to the contrary, has no claim to be called 'scientific' at all? or shall we rather say: "It may be so; but, at present, I see no cause to change my view and prefer to work with my own speculation; if you prefer yours, so be it. Where knowledge is so imperfect, proof is difficult and denial is folly." If we had taken the first attitude, which to my mind is quite unscientific, we should have now to eat our own words and agree that our once indivisible atom is now divisible; if we had taken the second, we could accommodate ourselves to the present view with perfect grace; this is the attitude which, I submit, ought to characterize the truly scientific man. I therefore hold that it is quite as scientific for the Ayurvedists to assume the truths of Samkhya, Visheshika and the like, as it is for the student of Western Medicine to assume the truths of modern Physics, Chemistry and the like.

If only our early European oriental scholars, to whose immense labours in the field of Sanskrit research we owe a debt which perhaps we can never repay, had not labelled our 'Shad-Darshanas' as the six schools of 'Philosophy' but explained and popularized the notion that with the Hindus all knowledge was one and indivisible, that facts of Science, Philosophy and Religion could not be cribbed, cabined and confined in separate water-tight compartments and that therefore the province of their 'philosophies' was wide enough to include science, religion and all else that is the subject or object of knowledge, then perhaps due attention would have been paid by our Western Scientists to those portions at least of these 'Philosophies' which deal with 'Science', and the world at large would have been made familiar much earlier with certain notions of Physical and Psychological Sciences which have now burst upon them almost with revolutionary suddenness—such notions, for example, as the conception of an atom as a highly complex 'system within a system' and the existence of dream-state (now fairly well recognized in the West) and other higher states of consciousness (not yet recognized by Western Scientists). It is of course arguable that these notions were merely the happy speculations of a highly imaginative

race ; it may be so ; but, where such speculations have the knack of forestalling the most recent discoveries, it is, I submit, worth our while to treat these speculations with becoming respect and regard them, at least, on the footing of provisional or tentative hypotheses. To be accepted as proven theories, much more of course, will have to be done. The conclusion must be shown to proceed strictly logically from the premises assumed, to *explain* satisfactorily the several facts of experience to which they relate, and to *work true*, when it is practically tested by experiments, or its predictions are put to the test of verification. So long as Ayurvedists are agreeable to work along these lines they are at perfect liberty to make their own assumptions and advance their own hypotheses ; and it is not for others to lay down arbitrarily 'thus far and no further'. It is as unscientific for the Western Scientist to say that his Hindu brother should not assume such and such a premise, as it would be for the Hindu Scientist to say that his Western brother should ; and this proposition remains fundamentally true even though it is proved later on that, as a matter of fact, the particular assumption and the particular conclusion based thereon were wrong wholly or in part ; for, as I have stated more than once, a proposition is admitted to be

scientific, not because there is any finality about its conclusions but because such conclusions are reached by the use of the scientific method. If that were not so, the writings of even the great Newton and Darwin would have to be classified as 'unscientific' because a later generation found that their views on 'Light-propagation' and the 'Origin of Species' respectively had to be challenged or modified. The fact of the matter seems to be that in no science is it possible to do away with assumptions altogether; any attempt to do that would mean the proving of every proposition that is advanced, assuming nothing, or taking nothing for granted; and this would inevitably mean that every inquiry would ultimately work back and back to the dead wall of first or final causes and stop there, being unable to go any further. Hence it will not do for us to go on asking at every step the futile question, 'But, how do I know that the premises are correct?' The inquiry is legitimate in its proper time and turn; but should not be made prematurely. Even a so-called exact science like Geometry cannot afford to be without its premises—its axioms and postulates, which are not proved but 'given' or taken for granted; not only so, we should also be prepared to be satisfied with premises, which are only approximately or partially

true. Let us take some examples from an 'exact' science like Geometry. If the postulates and axioms of Euclidean Geometry worked true in all cases, we should have three angles of a triangle always equal to two right angles; but, as a matter of stern fact, Clifford found that in the case of great triangles, there may be a difference of as much as 10°. Similarly, if, in Euclidean Geometry, it is taken as an axiom which requires no proof that two parallel straight lines could never meet, Gaussian Geometry would actually prove to you that they do, if produced sufficiently far; so too, if Euclidean Geometry meticulously deals with straight lines and plane surfaces, Reimann's Geometry would teach us that there can really be no straight lines or flat surfaces in nature, whatever appearances and Euclidean Geometry may say to the contrary; but do we, for these reasons, consider Euclidean Geometry unscientific or decline to make use of it for all that it is worth? No, most assuredly no, unless we are so unwise as to deny ourselves a useful avenue of knowledge. Let us keep these facts well in our minds when we deal with Ayurveda; let us remember that no science can afford to do away with premises altogether—not even with such as are known to be true only partially and not wholly; let us therefore be wiser than setting up

any unscientific limits to the perfectly scientific right of Ayurveda to advance any premises it wants to. Unquestionably, it is our right as it is our duty to examine the validity of the premises later on, as also to see how far their conclusions follow strictly logically from their premises, how far their theories offer satisfactory explanations for the diverse phenomena of health and ill-health, and how far the practices based on those theories work satisfactorily when applied to problems of preventing and curing diseases. All these inquiries are perfectly legitimate in their proper time and order ; meanwhile, let us accept the premises tentatively and pass on to study the general principles of Ayurveda as Ayurvedists know it.

PRELIMINARY SCIENTIFIC STUDY IN AYURVEDA

THE NEED TO LEARN THE EXACT MEANING OF TECHNICAL TERMS

Alike in Western Medicine and Ayurveda, a preliminary knowledge of certain fundamental Laws of Physics, Chemistry, Biology, etc., is essential for a proper understanding of the science of Medicine. Hence it becomes necessary for me to preface my discussion of the subjects of Medicine proper by a brief reference to certain fundamental theories which form the bases of Ayurveda. Before I do so I have to make a little digression regarding the translations of Samskrit technical terms like 'the Panchabhuta', 'the Thridosha', etc., whose current mistranslations are misleading even wary and well-meaning critics. Professor Westaway mentions foremost in his list of qualifications for those who wish to master the scientific method that they 'must learn to get at the *exact meaning* of words'; and among the causes of our failure in this respect, he rightly makes prominent

mention of the difficulty in 'translating from one language to another', adding incidentally that our failure to get at the exact meanings of words is responsible 'for nine-tenths of the wrangling that goes on in all the Council Chambers of the country'. If Indian Sciences and Philosophies are to be understood aright, it is necessary for us to realize this difficulty of translating from one language to another, and to learn to associate with Samskrit terms the exact connotations associated with them by Samskritist professors of those subjects.

THE PANCHABHUDA THEORY

Let us take, for example, the term 'Panchabhuta', Prithvi, Ap, Thejas, Vayu and Akash, generally mistranslated as the five, 'elements' 'Earth, Water, Fire, Air and Sky. Such a mistranslation naturally misleads people to say disparagingly of the knowledge of the Ancients that it was no better than to reckon the Earth and the rest as 'Elements' while the veriest school-boy now knows from his knowledge of modern Western science that they are not 'elements' at all but compound substances analysable into elements of various kinds. What the Ancients really meant by the term 'Panchabhuta' was, of course, quite different

from the elements of modern physics and chemistry—something beyond the elements and compounds known to them. "The five Bhutas stand for a classification of substances on the basis of their generic properties resulting, as the Sankhyas hold, from the structural type of their constituent atoms—a classification more physical than chemical or properly speaking chemico-physical, unlike the purely chemical classification of the so-called elements of modern chemistry. A Paramanu is a type of Atoms corresponding to each Bhuta class; and indeed one and the same kind of Paramanu may comprehend atoms of different masses, if only they agree in their structural type" [Seal: *Positive Sciences of the Hindus* (1915 Edition), page 40.] This classification is analogous to the classification of 'the States of Matter', the three states solid, liquid and gaseous of Modern Science and two more which are not yet specifically designated therein as 'states of matter' but which may be provisionally translated as 'Radiant Matter' and 'Ether' for want of better terms. That the states of matter should be not three but five and only five, follows strictly logically from the basic concepts of the Evolutionary Theory of the Hindus, according to which the five states of Matter—Prithvi, Ap, Tejas, Vayu and Akash correspond to the five senses, *viz.*,

the senses of smell, taste, vision, touch and hearing respectively ; the objective world of matter is comprehended subjectively by means of the five senses so far developed in Man at the present stage of his evolution ; and the objective series of the five states of Matter and the subjective series of the five senses are both evolutionary products arising in parallel series from one common origin in Prakriti (the material principle) at the level of Ahankar. We speak of five states of matter because we have so far developed five senses only to contact the world of matter and report to the Mind. If tomorrow we develop a sixth sense, we may speak of a sixth state of matter. This correlation of matter and senses is not quite foreign to modern Western thought as may be gathered by the statement of the distinguished scientist, the late Sir James Jeans, who has written ; " Matter may be defined as that which is capable of originating objective sensations—sensations which can be perceived by anyone who is suitably conditioned to receive them—as, for instance, by sending rays of light into our eyes." (*The New Background of Science* —1943 edition—page 12) This correlation between Matter, Senses and the Mind is, however, not developed in modern Western Science to the extent and in the manner developed in the Ancient Wisdom of

India where it serves to bring the knowledge of the Physical, Physiological and Psychological sciences into close interrelationship with one another as parts of one integrated whole—that fundamental oneness where there is unity of all knowledge.

The Ayurvedic definition and analysis of Matter in terms of Panchabhutas is subjective—that is, related to the sense-impressions resulting from contacts of Matter with the senses, while the Western analysis according to the chemical elements composing it is objective. From a philosophical standpoint, the subjective analysis provides the advantage and satisfaction of having a complete theory valid for all time (the attribute of Sanatana). In the objective analysis of the West, we have to go on adding to our list of chemical atoms as new elements are brought to light by Scientific Research. For example, the chemical elements were all listed under eighty and odd names when this Memorandum was first written. Since then, the list is being added to so that we have now reached No. 94—Plutonium. The subjective analysis has five ready-made niches fashioned for all time, in one or other of which all things known in the past and present as well as those that become known in the future find ready accommodation. The enunciation of theories having this quality of Sanatana

applicability for all time (past, present and future) is a general feature of Hindu analytical thought which strikes us throughout, as will be seen presently when considering the topics of Diagnosis and Treatment, Aetiology and Pathology etc. ; and will be dealt with at a little length under Aetiology where its comprehensiveness is a specially striking feature.

That the Panchabhutas stand then not for 'elements' of our Physical Sciences as the mistranslation of the term would have it, but for the five types or classes of objects in our material Universe correlated to the five senses by means of which we subjectively contact our objective Universe, will become even more clear when we consider the Panchabhutic classification of drugs where the Ayurvedists have added to the Darshanic description significant points correlating the general properties and actions on the human system of each class of drugs to the particular Bhuta predominant in the Panchabhutic constitution of the particular class concerned.

A QUEER DEMAND

The demand is frequently made by many followers of the modern Western Medicine, that if such

Ayurvedic Theories like the Panchabhuta and Thridosha Theories are to be acceptable as valid, then they should be explained to them in terms of modern Western Science and in a manner that should be clear to persons of ordinary intelligence not proficient in or acquainted with even the elements of the Darshanas or Ayurveda. Such a demand is likely to provoke a counter-demand by the followers of Ayurveda that if modern theories relating to the structure of Matter or the Atom or the constitution of Light, Electricity and Energy generally are to be accepted as valid, then they should be explained in terms of their own sciences and in a manner that should be clear to persons of ordinary intelligence not proficient in or acquainted with even the elements of modern Science. In the first place, it is not possible to explain or go into the root of the fundamental ideas underlying modern views on these topics without referring to such highly recondite concepts as, for example, 'the principle of Relativity' and 'the Quantum theory', for the proper understanding of which a high standard of mathematical knowledge is a necessary pre-requisite ; and even then, these concepts are, in the words of the distinguished Scientist, the late Sir James Jeans, "difficult to grasp and still more difficult to explain". Ordinary

text-books on Physics say very little on such recondite concepts; they deal only with topics like 'Properties of Matter' (in fact, some Text-books on Physics bear the title "Properties of Matter") which are within the comprehension of our ordinary school or college students. Exactly similar is the case with the Panchabhuta or Thridosha Siddhantas of Ayurveda which to use Jean's words quoted above, are 'difficult to grasp and still more difficult to explain'; for their proper understanding, a scholarly knowledge of the Darshanas is a necessary pre-requisite. Even with such scholarly knowledge, it may require concentrated thinking or meditation for a period—long or short according to the capacity of the individual concerned—before the real import of such a concept like the Thrigunas (of which I shall say something presently in regard to its relationship to both Panchabhuta and Thridosha Siddhantas) begins to dawn upon our minds; but the difficulty of grasping and explaining such recondite theories does not come in the way of their ordinary practical applications; for, just as ordinary Text-books on Physics deal with 'Properties of Matter', so do ordinary Text-books on Ayurveda deal with the properties of the Panchabhutas and the Thridhatus; and all these are within the comprehension of a person of ordinary intelligence who

approaches the study of these topics with the requisite preliminary study. For example, the distinguishing features of the three Dhatus—Vata, Pitha, and Kapha—both in health and ill-health are given in all standard Text-books of Ayurveda, and in great detail in some books; but to know their properties or effects does not necessarily mean we shall be able to define them or say exactly what they are in reality. This is the case with certain fundamental ideas as, for example, 'Electricity' so familar to us and so much talked of at the present day. From a study of its properties and its effects, we seem to sense or infer its presence without being able to define exactly what it is. As stated by the distinguished physicist and Nobel Laureate, Sir George Thomson, in his book on *The Atom* (1947-Edition), page 5: "It is becoming more and more impossible to define Electricity because it seems rather to be the fundamental idea in terms of which everything else must be explained and so cannot itself be explained without arguing in a circle. All that one can do is to state instances of what are regarded as Electrical effects and to argue by analogy from them." Similar is the case with the fundamental ideas of Ayurveda—with 'Vata', for

example, of its Thridhatu triad. We can state instances of what are recognized as Vatic effects and then argue or infer by analogy the presence of 'Vata'. This is necessary for purposes of Diagnosis and Treatment. It is fair to demand that the distinguishing features of 'Vata' and instances of what are regarded as 'Vatic' effects—both in health and ill-health—be stated. As I have said above, this demand is met in all standard works on Ayurveda ; but to go further and demand that 'Vata' etc., must be exactly defined or the Thridhosha Theory must fall is a queer demand. This is like demanding that Electricity must be defined or the Modern Electronic and related Theories must fall. The answer to the queer demand relating to 'Vata' would be similar to the answer of Sir George Thomson in regard to Electricity, namely, "it is becoming more and more impossible to define Electricity."

As regards the question interpreting or explaining the fundamental principle of Ayurveda in terms of modern Medicine, I am certainly all in favour of it as will be seen from my note on the question which appears later on ; but, as will be fully explained in that note, such interpretation will be subject to certain strict limitations because of the differences in the premises of Allopathy and Ayurveda. For

example, the Dahatu-Triad (the thridhatus), Vata, Pitha and Kapha, represent in the living individual those universal and inseparable Thrigunas (the Guna triad), Rajas, Satwa and Tamas, hypostatized, according to preponderance of one or other Guna, into Life, Mind and Matter, or the Vitality principle, the Psychic principle and the Physical Matter principle. Orthodox Western Physiology deals only with the last and not as yet with the vitality or psychic principle. Hence while we may attempt some sort of equating at the level of physical matter known both to Ayurveda and Allopathy, there is as yet nothing in the latter in terms of which things at the levels of vitality and psychic principles could be explained. This consideration as well as the fact that principles of classification in the two (Allopathy and Ayurveda) are frequently different make it difficult to equate or interpret things in terms of one to one correspondence, though striking similarities in thought will present themselves in the course of our studies. These are certainly worthy of fruitful study which I will proceed to illustrate presently ; but, it is to be understood that *what is indicated is mostly similarity and not identity or cent per cent equating of the terms and concepts of the one in terms and concepts of the other.*

THEORIES OF MATTER ACCORDING TO MODERN WESTERN AND ANCIENT INDIAN SCIENCES COMPARED

We are aware that, till not very long ago, Western Science held that every material object could be analysed back and back till we reached the atoms of some eighty and odd elementary substances (now reckoned as 94 including plutonium); these atoms (literally uncuttable things) were so-called, because they were all considered to be simple bodies incapable of further division. The modern notion however is that the atom is far from simple and indivisible, being, in fact, of so complex a structure as to resemble a solar system on a highly miniature scale, with a comparatively massive central proton-sun (constituting the nucleus of positive electric charge) surrounded at fairly respectable distances by a varying number of electron-planets (constituting the peripheral units of negative electric charge); nor does the complexity of structure end here; recent experiments have also shown that all the atoms of even one and the same chemical element may not be of one and the same kind; in fact Dr. Aston's experiments with many of our lighter chemical elements show that each of these elements is really not one element but a mixture

of different elements known as 'Isotopes', that is to say, elements with the same properties but with different atomic weights.

This was the position over twenty-five years ago when this Memorandum was first written. Then it was a comparatively simple proposition with only two entities or particles, *viz.*, Proton and Electron; but, this simplicity has gone; we have now to reckon with seven or eight; for recent investigations have postulated, in addition to Proton and Electron, Neutron, Neutrino, Neutretto, Positron and Meson besides cosmic Radiation and 'Photon' as the quantum unit of radiation. It may be that all these particles are not really elementary in a fundamental sense; future advances may show a new synthesis in terms of more fundamental and simpler conceptions as, for example, by synthesizing them all under the three possibilities in regard to Electric charge, *viz.*, positively charged particles like Proton or Positron, negatively charged particles like Electron, and Neutral particles like Neutron. "It is not clear," says Jeans, "which of the various particles are ultimate and indivisible and which are composite. For instance, many physicists have thought that a Proton may be a composite structure consisting of a Neutron and a Positive Electron in close combination; or again a Neutron

may consist of a Proton and a Negative Electron. A further possibility is that all such questions are meaningless; it may be that one set is just as fundamental as another. We have a certain amount of Mass and a certain amount of Electric charge in an atom; and the way we distributed them over constituent particles may be a matter for our own convenience rather than of absolute truth." (*The New Background of Science*—1943—pages 19 to 20). Under those circumstances and having regard to the fact that the ideas of Modern Science on this question are still very fluid, I have thought it better not to revise this part of the note at present but to leave it exactly as it was written over twenty-five years ago; because, the fundamental idea of a central sun or nucleus (whether envisaged as Proton or anything else) and a planetary or peripheral system (whether envisaged as Electron or anything else) still remains valid for the purposes of this note.

Such then is the conception of matter according to Modern Western Science; we can still conceive of the edifice of matter as being built up of some ninety 'chemical elements'; but, we can no longer look upon these elements as simple elementary substances incapable of further division—no longer as some ninety kinds of bricks whereof the edifice is

built ; they are rather so many 'brick-blocks', if we may say so, all built up of the same two kinds of bricks, *viz.*, the proton and the electron ; it it doubtless true that these proton-electron bricks have first to be massed into some ninety kinds of brick-blocks which are then used in various ways in building the edifice of matter ; but, one brick-block (constituting, say, the atom of nitrogen) differs from another (constituting, say, the atom of oxygen) not in the quality of their constituent bricks, which are everywhere of the same two kinds only *viz.*, proton and electron, but in the number and pattern of disposition of these bricks in each brick-block. In building the edifice of matter, different kinds of brick-blocks may be used, either singly or in combination for building different parts of the edifice ; but however different one part may appear from another, they are all built up of the same two kinds of bricks, *viz.*, proton and electron ; and the moment we recognize this common basis of all matter, we are already on the highway to Alchemy. If, by some means, we can but shake up the arrangement of the proton-electron bricks of the brick-blocks of a base metal like lead, into the proton-electron arrangement constituting the brick-blocks of a noble metal like gold, then, verily, we have achieved alchemy which, by the way, has now become quite

scientific and respectable ; several stars of the first magnitude in our scientific galaxy are now hard at work in achieving the transmutation of elements and some brilliant results have been reported already, although they cannot, as yet, be reckoned as successful business propositions ; but, to-morrow, even that may come to pass ; and if it does, it is some consolation to know that we are not now likely to denounce the successful wizard in this line as an infamous charlatan and cheat ; we are more likely to go tumbling over one another to hail him as the greatest F.R.S. of the day..

Now, let us turn for a moment to Hindu notions on this subject. What do we find here ? Ideas strikingly modern meet us from the very dawn of the history of Hindu Scientific thought : the Paramanu, which may be said to correspond to the atom of our Western chemists has ever been looked upon here as complex in structure, and never as a simple indivisible entity ; the modern conception of an atom as being a complex proton-electron system finds its parallel in Hindu Scientific thought from its very commencement, appearing all at once in its full-fledged modernness without passing, as in the West, through the stage of positing a simple and uncuttable atom. We may then look upon the Paramanu as

corresponding to the atom of our modern Western chemists, or to the brick-blocks of our analogy, but with a difference which may be explained thus. Modern Science teaches that though we have some ninety different chemical elements, yet, the Atomic brick-blocks of all of these are everywhere built of the same two kinds of bricks, *viz.*, the protons and the electrons ; according to the Hindu view also, every Paramanu brick-block is considered to be built of two kinds of bricks, *viz.*, the central bricks of one kind of Tanmatras (*i.e.*, Proto-matters charged with specific energy of one kind, and corresponding to the modern scientists' Protons charged with positive electricity) and the peripheral bricks of another kind of Tammatras (*i.e.*, Proto-matters charged with specific energy of another kind, and corresponding to the modern scientists' Electrons, charged with negative electricity). So far, both views seem to agree ; at this point, however, the Hindus have gone a step further ; they consider that, corresponding to each of the five Mahabhutas (*i.e.*, Prithvi and other 'States of Matter') there is a specific type, as it were, of proton-electron bricks ; in other words, there are not one but five types of proton-electron bricks, corresponding to the five 'States of Matter' (*i.e.*, to the five Mahabhutas, Prithvi and the rest).

As regards the exact nature of these five types of bricks, there have been some differences of opinion among different schools of Hindu thought. Ayurvedic authorities like Charaka and Sushruta follow mostly the Samkhya view, and sometimes the Vedantic; I shall therefore make brief mention here of both of these views.

THE GENESIS OF ATOMS—THE VEDANTIC VIEW

According to Vedantic Scientists, each of the five gross Bhutas (Mahabhutas) are derived from five corresponding subtile Bhutas (Sukshma Bhutas); these may be taken to correspond to the five Tanmatras of the Samkhyas which are, as I have stated above, proto-matters charged with energies of various kinds —the proton-electron bricks, if we may say so, that go to build up the Paramanus (the Atomic brick-blocks) of the five gross Bhutas; the Vedantists hold that into the structure of the atom of every gross Bhuta all the five subtile Bhutas enter in certain definite proportions. In the evolution of the atom of any particular gross Bhuta, say, Mahabhuta Prithvi, the corresponding subtile Bhuta (in this case, Sukshma Bhuta Prithvi) acts as the central radicle (corresponding to the proton brick of Modern

Science) while all the other four subtile Bhutas go to form the peripheral Electron-bricks of our Paramanu brick-block; the process of transformation of a gross Bhuta from the subtile Bhutas is technically known as Panchikarana (quintuplication) which is illustrated thus: "The Mahabuta Earth, gross Earth-matter, is composed of four parts of subtile Earth-matter and one part each of the other forms of subtile matter. The Mahabhuta Vayu is composed of four parts of subtile gaseous matter and one part each of the other forms of subtile matter." And similarly with other Mahabhutas.

Hence if ak, v, t, ap, p, represent the five forms of subtle matter (Akasha, Vayu, Thejas, Ap and Prithvi), and AK, V, T, AP, P, stand for the corresponding Mahabhutas, we may represent the constitution of the Mahabhutas as follows:

$AK = ak\text{-}4\ (v_1\ t_1\ ap_1\ p_1)$ ak-4 being the radicle.
$V = v\text{-}4\ (ak_1\ t_1\ ap_1\ p_1)$. v-4 ,,
$T = t\text{-}4\ (ak_1\ v_1\ ap_1\ p_1)$, t-4 ,,
$AP = ap\text{-}4\ (ak_1\ v_1\ t_1\ p_1)$, ap-4 ,,
$P = p\text{-}4\ (ak_1\ v_1\ t_1\ ap_1)$, p-4 ,, [1]

[1] *The Positive Sciences of the Hindus*, by Seal (1915 edition) pages 85-87.

As to the origin of these subtile Bhutas themselves, the Vedantic Scientists hold that each is derived from one which is higher in the scale; thus, subtile Prithvi comes from subtile Ap, which comes from subtile Thejas, which comes from subtile Vayu, which again comes from subtile Akasha; and all these subtile Bhutas are essentially Proto-matters charged with specific energies of various kinds. From the above formula of Evolution it will be seen that, according to the Vedantic Scientists, the contents of the central radicle is equal to the contents of all the peripheral units put together—a view that brings at once to our minds the notion of the Modern Scientist that the charge on the central proton is equal, though opposite, to the charges on all the peripheral electrons put together; but, there is this fact to be noticed, *viz.*, that the peripheral electrons would, in this view, be not of one kind but of four different kinds; it would be very interesting to know if this view finds any support from modern Science. In any case, it is the central radicle that is held to be the characteristic part. This is similar to the modern view that the nucleus is the characteristic part of an atom and that if you alter it, you get a new Atom or perhaps two as in certain cases of 'Atom splitting'.

THE GENESIS OF THE ATOMS—THE SAMKHYA VIEW

According to Samkhya Scientists, the five kinds of Bhuta Paramanus (Atom brick-blocks) are evolved from the corresponding Tanmatras by the process known technically as Samshritta Viveka (differentiation within the integrated); the building up of each kind of Bhuta Paramanu requires two kinds of Tanmatras (Proto-matter charged with energy)—one kind of Tanmatra acting as the central radicle, while another kind constituting the periphery, as indicated in the following table :

Types of Atoms	Tanmatras which act as the central radicle (corresponding to Protons of Modern Science)	Tanmatras which act as the peripheral units (corresponding to Electrons of Modern Science)
1. Akasha (Mono-Tanmatric).	*Shabda Tanmantra.*—(Proto-matter charged potentially with the energy of sound impacts; possesses potentially parispanda or Vibration energy.)	*Bhutadi*—the root of all proto-matters; but, it is not itself Tanmatra; to pursue this inquiry further is to seek for first or final causes which is not attempted here.
2. Vayu (Di-Tanmatric).	*Sparsha Tanmatra.*—(Proto-matter charged potentially with the energy of Tactile impacts; possesses potentially Vibration energy plus Tactile energy.)	*Shabda Tanmatra*

Types of Atoms	Tanmatras which act as the central radicle (corresponding to Protons of Modern Science)	Tanmatras which act as the peripheral units to Electrons of Modern Science)
3. Thejas (Tri-Tanmatric).	*Rasa Tanmatra.*—(Proto-matter charged potentially with the energy of Light and Heat impacts; possesses potentially vibration energy plus Tactile energy plus Light and Heat energy.)	*Sparsha Tanmatra.*
4. Ap (Tetra-Tanmatric).	*Rasa Tanmatra.*—(Proto-matter charged potentially with the energy of Taste impacts; possesses potentially Vibration energy plus Tactile energy plus Light and Heat energy plus Taste energy.)	*Rupa Tanmatra.*
5. Prithvi (Penta-Tanmatric).	*Gandha Tanmatra.*—(Proto-matter charged potentially with the energy of smell-impacts; possesses potentially Vibration energy plus Tactile energy plus Light and Heat energy plus Taste-energy plus Smell energy.)	*Rasa Tanmatra.*

GENESIS OF ATOMS—COMPARISON WITH THE MODERN WESTERN VIEW

It is sometimes objected that, in the theories of Evolution of Atoms adumbrated above, there is a

certain mixing up of 'Energy' and 'Matter'; that is quite true; but it cannot be helped; Modern Western Science itself is now being led to more or less the same position. When we are in the region of the practically weightless Electrons, we cannot help speaking of them, in terms of energy, that is, as charges of negative electricity, just as the Hindus speak of their Tanmatras as being charges of specific kinds of energy. Nowadays, we talk of Electrical 'Energy' being stored, bought and sold, just as if it were an article of merchandise like petrol. When we fight for concessions and monopolies for exploiting oil beds in Persia, Asia Minor and elsewhere, our greed is really not for matter but for energy; for every gallon of petrol means not merely a definite quantity of matter but also a tremendous amount of energy locked up in it. This energy is of various kinds; it is only a part of its chemical energy that Western Science has learnt to make use of for work in our power-houses, mills, factories, and the like; but, this is as small as the tiniest drop in the ocean when compared with the stupendous quantities—immensities upon immensities—of energy that remain locked up in its atoms. Fortunately for the world, Western Scientists have not yet been able to release this energy; I say 'fortunately' advisedly; for

when one reflects over the savagest and basest uses to which scientific knowledge was applied in the recent war, (this refers to the war of 1914-18) one shudders to think of the diabolical ghastliness that may result if people with the mentality of those responsible for the horrors of the last war come to possess the secret of releasing energies that may blow up continents as easily as they now do palaces and forts. [This was the position in 1922 when this Memorandum was written. Now, the immensities of nuclear energy have been released through "Atom-splitting" and the manufacture of Atom-bombs and applied to terrible destructive uses as at Hiroshima.] When we have proceeded thus far in our comparative study, a question irresistibly presents itself before our minds and it is this: Is this 'Atomic Energy' of modern Western Scientists the same as the Tanmatric energy, which, as we have just seen in our discussion of the Hindu conception of the evolution of Atoms, plays so vital a part in the genesis of the Bhutaparamanu, corresponding to our chemical Atom? The resemblance is very close; but, I must resist the temptation to hazard a definite answer, as it really requires a much better knowledge of both systems than what I have been able to gather.

I may, however, mention here that I discussed the matter with a profound and encyclopædic student of modern Physics, my friend Professor Yadunandan Prasad, M.A. (Cantab.), B.SC. (Lond.), who was very much interested to see the remarkable resemblances that do exist between the ancient Hindu and the modern Western conceptions of the structure of the atom. He suggested to me that Tanmatric energy corresponded in all probability to the energy locked up in the Proton-electron nucleus of the atom, and that, while the five types of Tanmatras or Pancha-Bhutas that the Hindus speak of has no definite counterpart in modern Physics, an explanation for the distinction may perhaps be found in the 'Quantum' theory of modern Physicists; this is a very interesting and valuable suggestion; for, the very word 'Tanmatra' contains a definite suggestion of 'Quantum' or measure (Matra); but then it is not enough for our purposes to have only one kind of quantum or 'Photon' as it is called, which would enter our eyes, contact our retinas and enable us to 'see' or become aware of the sensation of vision. We need four more or five in all to enable us to become aware of the intimations of all the five senses, namely, senses of hearing, touching, seeing, tasting and smelling; for, the Ayurvedists hold that the type of Panchabhutic

matter of each of our sense-organs determines the kind of sensation we become aware of when the mind attends to the report of the particular sense-organ concerned. We 'see' an object by means of our eyes because of the presence therein of Panchabhutic matter of the type of Thejas (Luminous or Radiant Matter ?) from which its predominant Tanmatra, *viz.*, Rupa Tanmatra (bundle of Photons constituting Light ?) move to enter our eyes and contact our retinas which report to our minds the presence of Light from the objects seen and we, the subjects, become aware of the objects seen. Similar is the case with our other senses so that, in this respect, Jeans may be considered to be in the authentic line of ancient Ayurvedists when he writes in his book (*The New Background of Science*—1943 edition—page 12) that "In general, we may say that we experience the outer world through small samples of it coming into contact with our sense-organs. The outer-world consists of Matter and Energy ; samples of this outer world consist of Molecules and Photons" ; but, as I have said above, it is not enough for Ayurvedists to speak of only one kind of quantum namely Photon. We need, in addition, Akousticons, Tactons, Gustons and Olfactons if these neologisms are permissible and suitable. If that day comes when

advances in modern Science would enable us to speak of these in terms similar to those we now speak of in regard to Photons, then, indeed, will have arrived the day when we can interpret in the language of modern Science the teaching relating to this subject contained in an Aphorism of Charaka, the father of Ayurveda, (Vide *Charaka-Sutrasthan*, Chap. VIII) which summarizes the teaching through correlations and correspondences shown below :

" It is certain that there are

1. Pancha Indriyas—The five special Senses.	Chakshus, Sense of Vision,	Srotram, Sense of Audition,	Ghranam, Sense of Smell,	Rasanam, Sense of Taste,	Sparsanam Sense of Touch,
2. Pancha Indriya Dravyas—The five matter-types of Panchabhutas predominantly present.	Thejas, Radiant matters,	Akash, Ethers,	Prithvi, Earths (Solids)	Ap, Waters (Liquids)	Vayu Airs (gaseous matter)
3. Pancha Indriya Adhisthanas—The five locations of the five special senses.	Akshi, Eye,	Karna, Ear,	Nasika, Nose,	Jihwa, Tongue,	Twak Skin

4. Pancha Indriya Vishayas—The five Tanmatra objects (Quanta ?) apprehended by the five senses.	Rupa,	Sabda,	Gandha,	Rasa,	Sparsa
	Photon.	* Audition or Akoustikon.	* Olfacton	* Guston	* Tacton

* If the above neologisms are ungrammatical or uncouth. I beg to be excused: for I know no Latin or Greek, If and when the need arises, the incorrect or uncouth terms will doubtless be replaced by correct and suitable substitutes.

5. Pancha Indriya Buddhis—The five perceptions.	Chakshur Buddhi (Perception of Vision) and other Buddhis (like Srothra Buddhi perception of audition etc.). These are Transformations of the five Sensations into the five corresponding perceptions when Sense-objects, Senses, Mind and Atman are in tune."

Such are the fundamental chemico-physical notions of the Hindus with which we must be familiar if we are to understand Ayurveda aright. To my mind these show in certain points striking correspondences to the most recent teachings of modern Western Science; in certain points the Hindus have gone even further in their speculations; will these conceptions also be justified by the future discoveries of modern Science? It is rash to assert and difficult to deny; but, when one realizes how some of these theories have been justified by the most recent events in modern Science, one cannot help entertaining the

feeling that, as some theories have already proved true, the same may happen in the case of others as well. In this connexion, it is also worth noting that the Hindu tradition about the origin of these theories refers to them as matters of direct observation and not of mere speculation. To understand how this comes about, we have to realize that the methods by which the Hindus sought to cognize things beyond the range of our senses, differed in one vital respect from the methods of the West. In modern Science, we seek to overcome the limitations of our senses by equipping ourselves with various *external* aids like the microscope, telescope, the spectroscope, the cardiograph and the like ; the Hindus however preferred to effect the same results, not by providing their senses with external aids, but by improving their own *internal* organs of sense, so that their range of perception may be extended to any desired degree. The way of effecting this improvement was by exercising the senses and the mind in certain ways indicated in the authoritative teachings and taught by the Guru to the Shishya when he was ready for it physically, morally and otherwise. It is claimed, for instance, that when they taught about the structure of the Atom, they did not merely speculate in the matter but described things as they directly saw them. It is

however recognized that, as evidence of direct observation, it is of value only to those great seers who could see things for themselves, and not for others; to these latter, it could be offered only as a good working hypothesis (or Kalpana), to which they are free to apply the various tests of a valid hypothesis before they accepted it. Herein lies the difficulty of the Hindu method; because, the perfecting of the senses to the desired degree can be achieved by only those few in our generation who are willing to pay the price of physical, moral and other disciplines necessary for acquiring the Yoga Siddhis required for the purpose; and therefore the satisfaction of direct observation is not possible to the great majority of us. Herein lies the immense value of the external aids which Western Science provides us with; for, many of us can learn with comparative ease how to use them in checking and verifying things for ourselves; and this is an advantage of very great value.

PRESENTATION OF ANCIENT WISDOM IN THE LANGUAGE OF MODERN SCIENCE

For a proper appreciation of the treasures of Ayurveda by the present generation of intellectuals in

India and the world at large, it is necessary to present them, wherever possible, in the language of modern Science. This may be illustrated by an example with reference to the great work of our distinguished countrymen the late Jagadish Chandra Bose. With the aid of his marvellous instruments of great delicacy and precision he demonstrated to an astonished world that the response to stimuli of both the so-called living, (*e.g.*, animals) and the so-called non-living (*e.g.*, plants) were so strikingly similar as to suggest one common Life animating both Kingdoms of Nature ; but, he was never tired of proclaiming from the house-tops that what he demonstrated was nothing new but was only part of that Ancient Wisdom which our great forefathers taught many millennia ago on the banks of the Ganga. This is certainly true. Nevertheless, the fact that Bose demonstrated the truth of the ancient teaching by methods and through tools of modern Science did serve to carry conviction to the minds of moderns in a manner and to a degree that was not realized before even by Indians familiar with the teachings of our Ancient Wisdom. It made the ancient teaching live once again in our minds as a living reality and be treasured as our precious and valued heritage—one of the many that diligent search and research by competent

investigators of the present and the future may unveil in course of time. Such, for example, are the Pancha-bhuta Theory of Matter, already considered, with its Matter-Mind parallellism and correspondence (the Pancha Bhuta, the Pancha Tanmatra and Pancha Indriya relationship) which integrates in a wondrously illuminating way our Physical and Biological Sciences into a comprehensive and fundamentally inseparable unity of origin and evolution; the thridosha Physiology, Pathology and Therapeutics; the Sankhya-yoga Psychology—theoretical and applied; the Vedantic view of Prana (the Life-Principle); the Dravya-Guna-Virya-Vipaka Pharmacology and Therapeutics; and the like. Each century and generation has had its own interests, outlooks and methods of expression of the same basic ideas and fundamental conceptions. There was a time in this country when Poetry was the medium of expression for all great ideas and teachings, even in the domain of the positive sciences. The means and symbology adopted for expressing the same fundamental ideas and basic truths have varied and will perhaps continue to vary from age to age and generation to generation. It may even happen that these may not be expressed through the symbology of words at all whether of the spoken language or written literature but find expression through the symbology of

Mysticism, Music, Painting, Sculpture, Architecture and the like. It is not often recognized, or recognized sufficiently, that all words, spoken or written, are only symbolical—as symbolical, for example, as the lines and contours of the static Arts or the poses and gestures of the Dance recital of Bharata Natya or other forms of the Dynamic Arts. When we feel thrilled, uplifted and transported to realms of rapture and ecstasy as we read a great literary classic, it is not the words, the writings consisting of certain black lines on white paper, that can, by themselves, produce the exalted result. The words and writings like painting and sculpture are but symbols suggestive of something far beyond themselves but capable of evoking in responsive minds something of the nature of the great thoughts and ecstatic experiences of the original authors, poets, philosophers, scientists, religiosi-mystics and other great creators of things of wisdom and grace, love and beauty. The same words and pictures (whether executed by pen or brush) which mean so much to cultured men and women educated in a particular way may mean nothing to others who are not so educated or not educated at all. Not dissimilar is the case with the fundamental ideas and basic truths of Ayurveda. They are written in a manner and on a

background appropriate and natural to the intellectual and esthetic atmosphere of the ages they were written for. They may now appear quaint to many modern intellectuals whose language of expression and understanding is that of modern Science. If we wish the treasures of Ayurveda to be understood and appreciated by students of Medicine and Science in modern India and the world at large, we have to express them in an increasing measure in the language of modern Science as far as it is possible to do so. The world at large and even intellectual India of the present day will not generally enthuse over the difficult task of attuning their minds to the manners and modes of expression natural to the intellectual atmosphere of the great days of the past when the treasures of Ayurveda forming part of our Ancient Wisdom and its precious Scientific heritage became enshrined in the classical works on Ayurveda. Hence the need—the urgent need—for presenting the Ancient Wisdom, wherever possible and as far as possible in the language and through the tools of modern Science.

A NOTE OF WARNING

It is, however, very necessary in this context to sound a note of warning as to what should not be

done. We should not torture Ayurvedic Texts to read into them modern Allopathic teachings through forced comparisons and fanciful interpretations. Where the import of the Ayurvedic Texts as understood in their ordinary and natural meaning is in harmony with the teaching of modern Allopathy on a particular topic, well and good ; we will do well to follow the lines of such fruitful studies and investigations. That would be a real service to both Ayurveda and Allopathy. Where, however, the harmonising of the two teachings is not yet possible in regard to any particular topic when the relevant Ayurvedic texts are understood in their own natural and ordinary meanings, we must not proceed to have recourse to forced and fanciful interpretations as though the final test of the validity of an Ayurvedic teaching is its agreement with the Allopathic teaching on the topic. The ultimate test as to which of the two different teachings on any particular topic should be more acceptable to us should surely be not what label—Allopathy or Ayurveda—it bears but which of them explains better the facts of experience and works better when applied to problems of health and ill-health. The reason why I am making a specific reference to this aspect of the question is because I see, now and again, attempts

being made to read modern Western teachings into Ancient Indian writings by a process of forced interpretations as, for example, when the nomenclature of modern bacteriology is read into certain Ancient texts of the Vedas or when certain fundamental concepts such as Vata, Pitha and Kapha of the *Thridhatu* Siddhanta of Ayurveda are equated to certain specific things of Western Physiology. In referring to analogous attempts relating to "Chakras", the late Arthur Avalon (Sir John Woodroffe) observed as follows in his book on "Serpent Power" (Kundalini Shakti):—"I desire to add that some modern Indian writers have also helped to diffuse erroneous notions about the Chakras by describing them from what is merely a materialistic or Physiological standpoint. *To do so, is not merely to misrepresent the case but to give it away*; for physiology does not know the Chakras as they exist in themselves—that is as centres of consciousness—and of its activity as Prana-Vayu, Sukshma or subtle Vital force, though it does deal with the gross body which is related to them. Those who appeal to Physiology only are likely to return non-suited". Every word of this is as true of concepts like Thridhatus—Vata, Pitha and Kapha as of the Chakras.

PHYSIOLOGY AND ANATOMY

THE THRIDHATU SIDDHANTA

Meaning of the terms " Dhatu ", or " Dosha " and " Mala "

The three Dhatus known as Vata, Pitha and Kapha are the three elementary and fundamental units or principles on which the building and sustenance of the body depend. Hence it is that they are called 'DHATUS', which literally means 'SUPPORTERS'. When they are in normal equilibrium, it is health; and ill-health when they are not, in which case the 'Dhatus' are technically known as 'Doshas' literally 'Faults'; this is because in this condition they give rise to 'Faults' or ill-health in the body. When normally disposed, the Dhatus are in their 'Prasada' (or pure) state, fit for the building and sustenance of the body; when abnormally disposed, they are in their 'Mala' (or impure) state, fit to be rejected and thrown out of the body as Kitta (Dross). When looked at from this standpoint of 'effecting impurity'

(Malinikarana), they are also spoken of as 'Malas' (impurities). These are the primary meanings of the terms Dhatu, Dosha and Mala. The term "Dhatu" has also a secondary meaning when the phrase "Sapta Dhatu" is used. In this context, it means the seven elementary tissues of Ayurveda *viz.* Rasa (Chyle), Rakta (Blood), Mamsa (Muscle) etc. which will be dealt with later. It is not at all difficult to know from the context in which meaning the term "Dhatu" is used in any particular case.

FUNCTIONS OF THE THREE DHATUS

It is held that the Dhatus exist in the Human body in two states, *viz.*, the Sthula or the gross state and the Sukshma or the Subtile state, Vayu, however, being, according to some authorities, always subtile. In their subtile states, they are Ateendriya—that is to say, beyond the normal cognition of our senses. How then are they known? They are known, both in their normal and abnormal states, by the consequences of the actions for which they are responsible. Thus according to Charaka (Sutrasthan, Chapter 18), Pittha, Kapha and Vata are respectively responsible for the following :—'Vision' (as opposed to perception which is due to Vayu), digestion,

heat-production, hunger, thirst, softness and suppleness of the body, lustre, cheerfulness and intelligence are due to Pittha in its normal state. Snehanam, smooth working of joints, general stability of the body, general build, potency, strength, forbearance, courage, and greedlessness are due to Kapha in its normal state. Enthusiasm, inspiration and expiration, voluntary actions like talking and walking, the due circulation throughout the body of its supporting elements like chyle, blood, etc., and the due discharge from the body of its excretory products, are due to Vata in its normal state. These functions of Vata are further elaborated thus by Charaka in the Sutrasthan. Chapter 12 : Vayu upholds all the supporting constituents and their due circulation throughout the body. It exists in five forms, *viz.*, Prana, Udana, Samana, Vyana and Apana. It is the urger of all voluntary movements, great and small, the producer of restraint as well as concentration of the mind, the stimulator of all the senses and the carrier to the mind of all sense impressions ; it holds together the various elements of the body in their proper form and maintains the cohesive unity of the body as a whole ; it brings about speech ; it is the basis of sound and touch, as well as the root matter of the organs of hearing and touch ; it is the origin of joy and enthusiasm and

the stimulator of Agni. It is the cause of the Doshas getting dried up and the Malas (impurities) being thrown out of the body ; it is the cause of division in all vessels of the body, both microscopic and macroscopic ; it is the cause which makes embryos in the womb to take particular forms ; and it stands as evidence of the existence of life ; all these are the actions of Vayu, when unexcited. When we are taken through this catalogue of functions for which Vayu, Kapha and Pittha are responsible, a critic will perhaps ask—and the question is perfectly legitimate —'What is the principle that underlies this classification into Vata, Pittha and Kapha ? To be scientific, a classification must be orderly and not chaotic ; I can see no intelligible principle or order, in this chaotic mixing up of Digestion, Intellection, Greedlessness, Respiration, Enthusiasm, and all the rest of it.' Now, this, as I said, is perfectly legitimate criticism. How is this answered in Ayurveda ? A vital concept that has to be understood in furnishing an answer to this question is the theory of Thrigunas "difficult to grasp and still more difficult to explain" ; but an attempt at exposition of the recondite concept has to be made because it is the correlation of Vata, Pittha and Kapha with the three gunas Rajas, Satwa and Tamas which, when properly understood, serves to bring

order to the apparent chaos of functions—some physical and some mental—for which Vata, Pittha and Kapha are held to be responsible.

THE GUNAS

According to all schools of Hindu thought, all "matter"—from the subtlest to the grossest—is characterized by the exhibition of the three 'Gunas' which are generally translated as 'qualities'—a rather unsatisfactory rendering; because the term 'qualities' suggests the idea of a pure abstraction, not the reality or substance, that 'Guna' is in Hindu thought; the notion of 'quality' is applicable only from the standpoint of Purusha (or spirit), because they are not Purusha's essence or substance (if we may use such a term with reference to Purusha) but merely accessories: from the standpoint of Prakriti or 'matter' they are its very substance, or rather the triune substance or three substances in one into which primal matter differentiated itself when the universe first came into manifestation. In this sense they are 'Dravyas' or 'substances' and not attributes. As stated by Wilson in his commentaries on Samkhya Karika, "In speaking of qualities, however, the term 'Guna' is not to be regarded as an unsubstantial

accidental attribute, but as a substance discernible by Soul through the medium of faculties." Though described as three 'Gunas', one Guna alone of these is never found isolated from the others—they are ever a mutually interdependent 'Unity-in-trinity'. Professor Seal speaks of them thus in his *Positive Sciences of the Hindus* (1915 Edition), pages 3 to 5:—"These Gunas are conceived to be Reals, substantive entities—not, however, as self-subsistent or independent entities but as inter-dependent moments in every real or substantive existence. . . The Gunas are always uniting, separating, uniting again. Everything in the world results from their peculiar arrangement and combination. Varying quantities of Essence (Satwa), Energy (Rajas) and Mass (Tamas), in varied groupings, act on one another, and through their mutual interaction and interdependence evolve from the indefinite or qualitatively indeterminate to the definite or qualitatively determinate. But though co-operating to produce the world of effects, these diverse movements with diverse tendencies never coalesce. In the phenomenal product whatever Energy there is, is due to the Element of Rajas, and Rajas alone; all Matter, resistance, stability is due to Tamas, and all conscious manifestation to Sattva. The nature of the interaction

is peculiar. In order that there may be evolution with transformation of Energy, there must be a disturbance of equilibrium, a preponderance of either Energy or Mass-resistance or Essence over the other moments. The particular Guna which happens to be predominant in any phenomenon becomes manifest in that phenomenon, and the others become latent, though their presence is inferred by their effect." That erudite oriental scholar, Sir John Woodroffe (formerly Judge of the Calcutta High Court), in referring to this subject of the interaction of Gunas in his "Tantra of the Great Liberation" (Introduction—pages 31-33) shows clearly how differences in Guna-collocations make for difference of 'temperament' in different persons—a subject of first-rate importance in Ayurveda :—"The term 'Guna'," he says, "is generally translated 'quality', a word which is only accepted for default of a better. For it must not be overlooked that the three Gunas (Sattva, Rajas and Tamas), which are of Prakriti, constitute her very substance. This being so, all Nature which issues from her, the Maha-karanasvarupa, is called Tri-gunatmaka, and is composed of the same Gunas in different states of relation to one another. The functions of Sattva, Rajas, and Tamas are to reveal, to make active, and to suppress respectively.

Rajas is the dynamic, as Sattva and Tamas are static principles. That is to say, Sattva and Tamas can neither reveal nor suppress without being first rendered active by Rajas."

The question has been raised, and answered too, by Hindu thinkers as to why the Gunas of 'Matter' are three, and three only, neither more nor less; but, a consideration of this question takes us to speculations concerning the 'First' or 'Final Causes', which it is best to leave unattempted here. It is enough for us to note that this triplicity of Prakriti (or matter) corresponds to the triplicity of Purusha (or spirit), and that this triple nature, alike of 'Matter' and 'Spirit', is a primal, fundamental and inescapable characteristic—the very essence so to speak—of every manifested existence; for, in this phenomenal universe, there is neither 'matter' (Prakriti) alone, nor 'spirit' (Purusha) alone, but it is ever Prakriti-Purusha (spirit-matter)—spirit ever limited by matter, and matter, ever ensouled by spirit. But, of course, 'spirit-matter' is of various grades—minerals, vegetables, animals, human beings, divine beings and so on. From the subtlest and highest Deity or Ishvara to the lowest and grossest stone, all is "spirit-matter". What differentiates us distinctly as human beings from the other kingdoms of Nature is not so much

the fact that our physical bodies have a distinct anatomy of our own (even our corps es have that) but the fact that Jivas (or Egos or Consciousnesses) have reached, in their evolutionary ladder, to a particular rung (*viz.*, the human rung), while the Jivas (Egos or Consciousnesses) animating the animal and other kingdoms of Nature are still at its lower rungs—younger brothers of ours, standing at those levels, where we ourselves stood yesterday or the days before, counting by Nature's time. Looking at it in this way, there is nothing in this world which is not a Jiva or a Consciousness or a living being ; everything is living matter characterized by the three Gunas—Rajas, Satwa and Tamas ; we have Rajasic, Satwic, or Tamasic animals, vegetables, foods, drinks, drugs, etc., just as we have Rajasic, Satwic, or Tamasic human beings. It is all of One Life—all is 'spirit-matter' *(Purusha Prakriti*). In the light of this teaching, we can understand why the Ayurvedists hold that the Life of the human being, like Life in any other kingdom of Nature, must necessarily exhibit a primal and fundamental triplicity, *viz.*, Rajas, Satwa and Tamas, a triplicity which in the living human being is shown in Life, Mind and Matter or Vata, Pittha and Kapha respectively. In the light of this teaching, we may be able to follow the statement already made that

the Dhatu triad, Vata, Pittha and Kapha represent in the living individual these universal, inseparable Thrigunas (The Guna triad) *Rajas*, *Satwa* and *Tamas*, hypostatised, according to preponderance of one or other Guna, into *Life*, *Mind* and *Matter* or the *Vitality principle, the Psychic principle and the Physical matter principle in man.* Orthodox Western Physiology deals only with the last and not as yet with the Vitality or Psychic principle ; from this standpoint, its language is of one dimension only while the language of Ayurveda is of three dimensions as it were. Hence, while we may attempt, as stated before, some sort of equating at the level of Physical Matter known to both Ayurveda and Western Physiology, there is nothing as yet in the latter with which things at the levels of the vitality and psychic principles of Ayurveda could be equated. We frequently find that Vata is equated to Nervous system or Nerve-force, Pittha to Digestive and other enzymes and Harmones and Heat-regulating Mechanism and so on. At best, such equating may work at the Physical level in a number of cases ; but it breaks down at other levels and in certain cases, even at the Physical level. For example, intellection is a function of Pittha representing preponderance of Satwa Guna. Intellection in Western Physiology would come under Nervous

system (cerebro-spinal) which is equated with Vata. Here is a case where the equating of Vata and Pittha as given above is seen to be untenable. The untenability of such equating also arises from the fact that the principles of classification of the things equated are of two radically different orders. When Western Physiology speaks of the Nervous tissue, Muscular tissue, Epithelial tissue etc., the principle of such classification is mainly anatomical based on the structure of the component parts. The principle of classification into Vata, Pittha and Kapha triads are mainly Biological based on functions correlated to the three gunas. The futility of attempts to find one to one equivalents between terms of these two classifications may be illustrated by an analogy with reference to an attempt as equating each territorial division of a city like Madras with a particular division of, say, its communal or professional distribution. Each territorial division comprehends many communal elements—Hindus, Muslims, Parsees, Christians, Harijans etc., and there may be variations, in this respect, from division to division, one division containing all the communal elements of Madras while others may show varying numbers less than the total number of communities found in Madras. Similarly, each division may comprehend Teachers, Lawyers, Doctors,

Artisans etc., representing the various professional classes residing in Madras ; and there may be variations from division to division varying with the numbers and classes of the professional elements resident in each division. Under such circumstances, the question of equating the terms of different classifications in terms of one to one agreement would be a futile proposition. Not dissimilar is the attempt to equate the terms of the functional classification of Vata, Pittha, and Kapha in terms of the structural classification like the nervous system, glandular system, skeletal system and the like. It would not be correct to equate the functions of Nervous system as a whole to Vata alone or to equate functions of the Vata to Nervous system alone though this is done by certain scholars engaged in comparative study. Vata, Pittha and Kapha are each responsible for certain functions of both the Psychic and nervous systems ; it is not Vata alone that is responsible for functions of the nervous system as a whole. So too, Vata, Pitha and Kapha are each responsible for certain functions of the digestive system ; it is not Pitha alone that is responsible for functions of the digestive system as a whole. So long as the principles of classifications and even the very definition of a human being are so different as in the case of Ayurveda and Allopathy it is futile to

seek equations of exact equivalence or one to one agreement. Further, the terminology of Vata, Pitha and Kapha is used in relation to the *living* human body only while, in speaking of the same body after death—after the human Jiva has withdrawn from it—it is said that the body has attained Panchatwam (a synonym of death) to indicate that the terminology to be used thereafter is the genera· Panchabhutic one applicable to all physical matter generally and not the terminology of Vata, Pitha and Kapha applicable to the *living* human being. Orthodox Western Physiology deals with the human body as only a Material entity while to the Ayurvedist the living person is really a Jiva or Spiritual entity animating and functioning for a time through Material bodies or Koshas such as the Mental, Emotional and the Physical. Under the Ayurvedic View, Jiva functions in and through all Koshas; and Vata, Pitha and Kapha are responsible not only for certain physical functions but also for certain Mental and Emotional functions classifiable under the Heads of Rajas, Satwa and Tamas. It is in this classification that we should seek to find the answer to the query of the critic noted at the beginning of this topic which was to the following effect :—" In the list of functions of Vata, Pitha and Kapha, there is a chaotic

mixing-up of physical and mental functions. What is the principle that brings order into this chaotic mix-up ?" The answer is that the physical and mental functions of Vata come, quite logically and understandably, under "Rajas," those of Pitha under "Satwa" and those of "Kapha" under "Tamas". With this light, we may be able to see order where we saw chaos before and also to see order at all levels of our lives—physical, emotional and mental and not merely at the physical.

NATURE OF THRIDHATUS

From this it will be seen that Vata, Pitha and Kapha correspond to the Panchabhutas, as and when, operated by a human Jiva ; the Panchabhutic analysis of the body is essentially a physical conception (just as the Physicist may say that matter is built up of solids, liquids, gases, etc.), while the Thri-dhatu analysis is essentially a Biological or rather a Bio-physical one, corresponding to the primal and fundamental triplicity, *viz.*, Rajas, Satwa and Tamas, exhibited by the human Jiva. As regards the correspondences between these two classifications (*viz.*, the Physical and the Biological), Akash and Vayu are held to enter into the constitution

of Vata (which is Rajasic) while Thejas is held to enter into the constitution of Pittha (which is Satwic) and Prithvi and Ap, of Kapha (which is Tamasic). I must also mention here that, according to some authorities, the reason for not taking separate note in the dhatu category of Akash at one end of the scale of Panchamahabhutas and of Prithivi at the other, is this ; Akash is unmodified and all-pervading, while Prithvi is the last of the five Mahabhutic states of matter, and there is no further modification beyond it ; from the standpoint of Dhatu interaction and equilibrium, the due maintenance of which is the concern of Ayurveda, it is not necessary to take separate note of things which are not modified ; hence it is that Akash is grouped with Vayu while Prithivi goes with Ap. Be this as it may, we may envisage the thridhatus Vata, Pitha and Kapha as the three Bio-physical elements, or corpuscles charged with human life, and corresponding respectively to Rajas, Satwa and Tamas. They stand, in the living body, for three groups of substances, the individuals of which, however much they may differ from one another, possess nevertheless certain characteristics common to every member of the group ; thus, Vata corpuscles are all predominantly Rajasic, Pitha corpuscles, all predominantly Satwic and Kapha corpuscles,

all predominantly Tamasic. We may therefore describe Vata, Pittha and Kapha thus :

Vata is that primal constituent of the living body, whose structure is Akash-Vayu, and whose function is Rajasic, it being concerned with the production of those physical and mental processes which are predominantly Rajasic (activating or dynamic) in nature : hence, as has been noted in the catalogue of the functions of Thri-dhatus discussed already, the presence of Vata is to be inferred in such mental phenomena as exhibition of enthusiasm, concentration, etc., as also in such physical phenomena as respiration, circulation, voluntary action of every kind, excretion and so on. It will be seen that many of these physical phenomena are included among those which Western Physiologists would assign primarily to the activities of the nervous system (both cerebro-spinal and Autonomic).

Pittha is that primal constituent of the living body, whose structure is Thejas and whose function is Satwic, it being concerned with the production of those physical and mental processes which are predominantly Satwic (balancing or transformative) in nature ; hence the presence of Pittha is to be inferred (vide catalogue of functions of the Thri-dhatu given before) in such mental phenomena like intellection and clear

conception, as also in such physical phenomena as Digestion, Assimilation, Heat-production and so on ; it will be seen that many of these physical phenomena are among those which Western Physiologists would include under the activities of the Thermogenetic and nutritional systems (including Thermogenesis and the activities of glandular or secretory structures—especially of the Endocrines or Ductless glands, whose Internal Secretions or Hormones are now known to be of such vital importance in Digestion, Assimilation, Tissue-building and Metabolism generally).

Kapha is that primal constituent of the living body, whose structure is Ap-Prithvi and whose function is Tamasic, it being concerned with the production of those physical and mental processes which are predominantly Tamasic (conserving or stabilising) in nature ; hence the presence of Kapha is to be inferred in such mental phenomena as exhibition of courage, forbearance, etc., as also in such physical phenomena as the promotion of bodily strength and build, integration of the structural elements of the body into stable structures, the maintenance of smooth working of joints, and so on. It will be seen that many of these physical phenomena are among those which western physiologists would include under the activities of the skeletal and anabolic systems,

but, it is difficult to interpret in terms of Western Physiology, that all-important function of Kapha, which is concerned in protecting the tissues from being consumed, as it were, by the internal 'fires' of Pittha, if they were not kept in check by the 'waters' of Kapha. It seems probable that the problem of explaining how the internal 'fires' in the living body were ever kept burning bright, though surrounded always by the 'waters' of the body, exercised the minds of the Hindu Scientists, just as, since the times of Lavoisier, the minds of Western Scientists are being exercised over the analogous problem of explaining how, at the comparatively low temperature of about 37° C, physiological oxidations are being continually carried on in the living body, at a comparatively rapid rate, while, outside the living body, the same materials are consumed or oxidised with extreme slowness.

There are many things now happening in the world of modern Science and modern Medicine which may make us, unless we are careful, to jump to hasty conclusions on the basis of a few striking resemblances; but, such temptations must be resisted while the critical study and investigation of recorded facts and observations must go on with all possible diligence. In illustration of what I mean to convey,

I may consider here a pointer in relation to the very topic of the Thridhatu theory that I have discussed above, in the light of what is referred to in the latest books on modern Physiology as "The Humoral transmission of Nerve impulse".

Sarangadhara, a renowned Ayurvedic authority with a flair for expressing Scientific facts through impressive poetic imagery speaks of Pitha and Kapha humors as (Pangu Lame individuals) dependent for their movement from place to place on the lead given by Vata dhatu and journeying to whatever place Vata leads them. This is, of course, in perfect consonance with the ancient teaching that Rajas is responsible everywhere for movement of every kind and that as Vata is the Dhatu in the living human being which is preponderatingly Rajasic in nature, it is the Vata humour that brings about the movement of every kind and degree including the transmission and circulation of bodily humours, body fluids and bodily elements of every kind.

Professors of modern Physiology have now begun to speak of "Humoral" transmission of nerve impulses without the least suggestion of the term "Humoral" being unacceptable to them as when the Ancient Thridhatu theory was spoken of as the exploded or discarded "humoral" theory. On the contrary, they

say that the evidence is now very complete that nerves do not act on the tissues directly but through the Agency of Chemical or "humoral substances" like Acetyl-choline, Adrenaline and the like. Acetyl-choline is released at the nerve-endings of ordinary Somatic nerves. It is also liberated in the region of Motor nerve-endings or plates ; and it now seems likely that many of the phenomena noted in relation to muscles are explicable as due to release and accumulation of Acetyl-choline at nerve endings. Some sympathetic nerves have also been shown to show a chemical or humoral substance, sympathin, which has an action almost identical with that of Adrenaline and the opposite action of Acetyl-choline. Humoral transmission may also occur within the nervous system itself ; for, if fluid is passed through the superior cervical ganglion and the sympathetic stimulated, Acetyl-choline is released into the perfusion fluid. Every organ of the body over which we have no voluntary control appears to be supplied with two sets of fibres—from the sympathetic and the parasympathetic—which have opposite functions. The sympathetic or accelerator group is termed *Katabolic* (according to Gaskell's nomenclature) as they are concerned with general increase of work and utilisation of energy in the various parts of the

body while the Parasympathetic group is termed *Anabolic* as it is more intimately concerned with the processes which take place during bodily rest. Here then we have the idea of two systems—the sympathetic and parasympathetic—with opposite functions, one being Katabolic and the other Anabolic. In either case, the resulting action is due to release of certain humoral substances of two groups with opposite properties namely the adrenaline group released by stimulation of the sympathetic or Katabolic nerves and the Acetyl-choline group released by the Parasympathetic or Anabolic nerves.

From this, it is tempting to jump to the hasty conclusion that the two classes of humoral substances of Allopathy with opposite properties are equatable to the two humours of Ayurveda with opposite properties *viz.*, Pitha (the Katabolic or breaking-down humour) and Kapha (the Anabolic or building-up humour) which are both Pangu or lame humours in the language of Sarangadhara, their transmissions and releases at any point or points being dependent on the humoral transmission of the stimulated Nerve-impulse equatable with Vata-activity. Thus, we may be tempted to conclude, is the ancient Ayurvedic teaching justified by the latest findings of modern Allopathy; but, this temptation must be resisted;

for, the comparisons and resemblances are far too superficial and the recorded observations and experiments confined so far too limited a field to justify any such general conclusions being drawn.

PRAKRITI (TEMPERAMENT)

Persons are broadly marked off from one another into three classes or groups, *viz.*, Vatala, Pitthala, Shleshmala, according as the type of their inherited Thridhatu-constitution shows respectively a predominance of Vata, Pittha or Shleshma ; those Dhatus which are not predominant may be either co-operant or latent, so that we have a number of sub-groups, each with its own type of inherited Thri-dhatu balance ; then again, depending upon quantitative variations, we have many ways in which Thri-dhatu equilibrium is possible ; it is due to such differences in the constitution of the inherited dhatu balance that every person somehow differs from every other person, although all are classifiable under one or other of the three primal and fundamental groups spoken of above, *viz.*, persons of Vata, Pittha and Kapha prakritis, or ' temperaments ' as the English rendering has it. In Ayurveda it is of vital importance to know the Prakriti or ' Temperament ' of every

person, because all his life-activities, both in health and disease, have to be judged and adjusted with reference to his own type of inherited dhatu-constitution; and we cannot intelligently adjust his Nurture (including his nutrition and environment) unless we know his Nature or Prakriti. For the proper diagnosis of a person's Prakriti, a careful examination (both physical and mental) is necessary; the characteristic features of each group are set down at length in works on Ayurveda; but, for our present purpose, it is not necessary to go into those details; it is enough to know that it is a cardinal principle of Ayurveda that all human beings are broadly classifiable under the three primal groups of Vatalas, Pitthalas and Shleshmalas, according as the constitution of their inherited dhatu-triads show a predominance of Vata, Pittha or Kapha substance. That leaders of Medical thought in the West have now begun to think along similar lines may be gathered from the following extract from the writings of a distinguished British Physician, Dr. Leonard Williams, which reads strikingly 'Ayurvedic' even to the very notion of a person's inherited features and constitutional peculiarities being dependent on the peculiar mode of mixing or combining of his inherited 'humours' or 'essences' as he calls them:—" While the time is not yet ripe for dogmatic

statement, there is a large mass of evidence which goes to show that the ductless glands, the endocrines, with their essences, their hormones as they are called, constitute the mainspring of this surprising mechanism. Nor does the importance of the endocrines stop here ; for, according to the exact proportion in which their essences are admixed in your blood, you are tall or short, dark or fair, phlegmatic or choleric, saint or sinner, sexual, homo-sexual or sexless, male or female." (British Journal of Psychology, Medical Section, Volume II, page 262.) Then again, we have Prof. Goddard stating thus in his "Psychology of the Normal and the Sub-Normal" (page 228) :—
"Cannon's and Crile's discoveries and other work with the ductless glands made it entirely possible that, while we may not be dealing with blood, yellow bile, and whatever fluids the ancients thought of under the name of black bile and phlegm, we may nevertheless be dealing with such fluids as are secreted by adrenal glands, thyroid glands, the thymus and the other glands of internal secretion. It would seem quite probable then that we are to think of different individuals as having inherited different constitutions in these particulars." So too we may cite evidence in support of the 'humoral' theory from the large mass of facts that have now gathered round the subject of

the Transfusion treatment of haemorrhage, shock etc., and the classification of persons according to their types of blood-grouping, depending on their possession of certain humoral substances or factors (including the recently discovered Rh. factor) all stated to be inherited according to the Laws of Genetics.

METABOLISM AND THE SEVEN DHATUS

Metabolic changes, like all life activities in general, are brought about, maintained and regulated by Vata, Pittha and Kapha ; we may consider first the processes by which the food ingested is transformed into various tissue-elements or 'Dhatus', as they are called. It has to be noticed here that as stated before, Ayurvedists use the same name, *viz.*, Dhatu (literally 'support') to designate both the primary Dhatus Vata, Pittha and Kapha, as also the secondary ones, *viz.*, Rasa, Rakta, and other elementary tissues, which we are going to consider now. The exact sense in which the word is used in any particular case can be easily made out by the context. It may also be mentioned here that these secondary Dhatus are also called 'Dushyas' (or Vitiables), so-called because they can be vitiated by the primary Dhatus (Vata, Pittha and Kapha), which when looked

at from this standpoint of *causing* vitiation are spoken of as 'Doshas' (literally faults). We may now go on to consider how food is transformed into various Dhatus; the first step is the conversion of food into Rasa dhatu; this takes place in Amashaya, Grahani and Pakwashaya (Region of Stomach, including Pylorus and Duodenum); the agents concerned in the production of Rasa from food are Vata, Pittha and Kapha. Vata in the form of Prana Vayu sends food down the gullet into the stomach, whence after certain changes it is sent down the Grahani into Amashaya; in these digestive chambers food is acted upon by Pittha (Pachaka Pittha) in the menstruum of Kapha present there and gets converted into Rasa (Chyle), which contains, in essence, all the ingredients necessary for the formation of the various tissue-elements of the body. The essence of food becomes the Rasa Dhatu, while its dross is rejected as Mala. In a similar way we get by the repeated action of Vata, Pittha and Kapha, the transformation of Rasa (Chyle) into Rakta (Blood), Rakta into Mamsa (Muscle), Mamsa into Medhas (Fat), Medhas into Asthi (Bone), Asthi into Majja (Marrow) and Majja into Shukra (Reproductive elements). Rasa is driven by Vayu to the heart and then to the liver and spleen, where the appropriate pre-rakta constituents

of Rasa are acted upon by Agni or Pittha (Ranjaka Colour-giving Pittha) in the menstruum, of Kapha and becomes transformed into Rakta ; this again is acted upon by Vayu and Agni (Mamsagni) in the menstruum of Kapha, when transformation into Mamsa takes place ; this process is repeated till, by successive transformations, we get Asthi, Majja and Shukra. It is also held that every one of the Dhatus from Rasa to Shukra elaborate, during the course of its metabolic transformation, a special subtle essence, which goes to form the Ojas Dhatu which is, as it were, the quintessence of all the seven Dhatu essences. The presence of Ojas is of the very essence of our life-activities ; and if the successive metabolic transformations that end in the production of Shukra Dhatu (the Reproductive Elements) are not properly formed, then, the Ojas-formation suffers, and life-activities themselves may cease altogether from lack of Ojas, if the metabolic transformations cease to be performed for an unduly long time. Each of the Sapta dhatus is thus seen not only to take from the common stock whatever is necessary for its own normal life but also to give to that same common stock its own best and highest essence (Prasadam) as its special and necessary contribution for the normal life of the organism as a whole. The *Sine qua non* for

the healthy life of each individual dhatu is that it should contribute its best to the healthy life and common good of all the Dhatus constituting the whole of the organism. Such is the Law governing the life and health of each individual Dhatu—that it should seek and find its own highest good by working for the highest and common good of all the Dhatus constituting the organism as a whole. This is only the application in the field of human organism of a most beneficent and universally-applicable Law (Dharma) that the highest good of the part is secured automatically when that part and all other parts co-operate to work for the highest good of the whole—a beautiful thought reminding us of a memorable teaching of our ancient scriptures that the due performance of Sacrifice (Yagnya) by each individual is the Law (Dharma) which governs the highest good of all (Lokasangraha). Where each Dhatu or part so works as to contribute its best as its special sacrificial offering, joyously and dutifully laid at the altar for the worship of the common good of the whole, its work is verily its worship and its sacrificial offering is returned to it blessed, and sanctified for its highest good. Such is the Law or Dharma. This is good Physiology as well as good Philosophy and sound Sociology.

As far as I know, there is as yet nothing in Western Medicine corresponding to the above-noted conception of the metabolism of the Sapta Dhatus leading to their orderly evolution from Rasa to Rakta, Rakta to Mamsa and so on to Sukra and Ojas. It may, however, be noted that the conception of a special Dhatwgni (Mamsagni, Medogni) existing in each Dhatu and becoming activated by Vata during its metabolic processes in the substrate or menstruum of Kapha bears some resemblance to the conception of Endo-enzymes as envisaged in the following extract from pages 1022 to 1026 of Howell's *Text book of Physiology*—(1946 Edition): "In Life, Endo-enzymes play their part within the bounds of the cells in which they are contained and probably constitute the chief means through which are effected the metabolic processes that characterise living matter . . . In many cases, it can be shown that the Enzyme exists within the cell in an inactive form; and requires the Co-operation of some other substance before it is capable of effecting its normal reaction. In such cases, the second substance (Activator) is said to activate the enzyme. . . . In some cases, it may be supposed that after the enzyme combines with the substrate, further effect upon the substrate depends on the activity of a Co-enzyme."

The Ancient wisdom of India has a vast literature relating to the subject of "Prana", the Life or Vitality principle which with Mind or Psychic principle and Matter or Physical principle correspond to Rajas, Satwa and Tamas respectively, characteristic of Prakriti in all its myriad forms of manifested existence. Life is one aspect of the universe of which Form is the other. The term "Prana" has many meanings and shades of meanings which are to be understood from the context in which the term is used. A recent writer has catalogued one hundred and one senses in which the term is used in the Samhita literature alone of the Vedas excluding the Brahmanas, Aranyakas and the Upanishads. This may serve to indicate the vastness and richness of the literature available on the subject. In a general sense, Prana is, according to Vedanta Darshana, a fundamental or basic principle co-existent with Spirit and Matter and bringing them into intimate and inseparable relationship with each other at all levels of their manifold existence. The Yoga Darshana uses the term in a special sense when it speaks of Prana and Pradhana as constituting man. In this sense, Prana is spirit or the Self with such envelopes of matter as it has identified with itself

at any time while Pradhana is non-self or Matter which can be put aside and viewed objectively. As the Yogi progresses from stage to stage, Prana and Pradhana show changes in their content so that the Self identifies itself with less and less of enveloping matter and is able to put aside more and more of it into Pradhana for being viewed objectively as not-self. It is however, in Prana as it is manifest in Pranamayakosha that the interest of the Ayurvedist specially lies. According to Vedanta Darshana, the Jivatman (the Self or Soul) in man is clothed in five koshas or sheaths of matter of which the matter of the gross physical body—Annamayakosha (literally Food-filled body) is the densest with Pranamayakosha (Prana-filled body) coming next to it with matter in a comparatively sukshma (subtle or ethereal) state. Prana from Pranamayakosha pervades every part of the living physical body or Annamayakosha as Electricity pervades every part of a *live* wire. If Electricity ceases to pervade the wire, it ceases to be a live wire. So, if Prana is withdrawn from or ceases to pervade the living physical body, it ceases to be alive. Orthodox Physiology in the West is yet in the stage of presenting automatic resistance to the acceptance, even on the basis of a working hypothesis, any theory of Prana or vitality principle,

lest such acceptance should mean the acceptance of the theory of Vitalism or Vital action which is still taboo in orthodox physiology. It still cherishes the hope that vital action will someday be explained in terms of physics and chemistry tho' it cannot help admitting it cannot deny the existence of a property of living matter which has not yet been brought into line with the known chemical and physical forces and which sometimes operates, actually neutralising such known forces. (Vide—p. 299 of *Handbook of Physiology and Biochemistry*, by Prof. Mcdowall—1946 Edition). Under such circumstances, there seems to be no common basis to proceed any further with the attempt to present the teachings of the Ancient wisdom relating to Prana in the language of modern Science.

There is, however, one topic in this connection which may be of special interest to our Surgeons; and it is the one on "Marmas" or vital areas which are like special reservoirs of Prana as in the case of the three Principal Marmas—Hridayam, Shiras and Vasthi or like junctions of Pranic currents as in the case of the other 107 Marmas described in Sushruta and other standard works of Ayurveda. The importance of these Marmas to the surgeon is that cuts and injuries to those vital spots are attended

with serious and sometimes even fatal consequences. The surgeon is therefore warned to remember that there are some Marmas which the Surgeon's knife should never touch, some which may be touched at one inch distance and some, at two inch distance and so on. This is a teaching which admits of crucial testing by surgeons interested in the subject.

AYURVEDIC ANATOMY

In Ayurveda, Anatomy and Physiology are generally treated together under the heading of 'Shareera'; the relation between them is undoubtedly very intimate, they being the two limbs of Biology. Though, for the convenience of description, the study of structure (or Anatomy) is in Western Medicine dealt with separately from the study of Function (or Physiology), still it is only when they are studied together as the two limbs of Biology that the real value of each to the other and to Medicine as a whole is best appreciated.

The past and the present of Ayurvedic Anatomy is so very well reviewed by the late Dr. Kaviraj Gananatha Sen in the introduction to his Pratyaksha Shareeram (a work on human anatomy written in Sanskrit) that I cannot do better than cite the

following extracts from his masterly review :—' That the subject of Anatomy formed part of a preliminary course in Medicine and Surgery in ancient India admits of little doubt. Nay, a short course of Anatomy was once held a necessary adjunct in the intellectual outfit of even a general student, so that writers of the Puranas and Dharma Shastras found it expedient to include short discourses on the subject in many of their works. Anatomical discourses are also found in the hoary Vedas and in the aged Nirukta of Yaska, as also in old Buddhistic literature. In the ancient medical works of Sushruta and Bagbhata, both major and minor surgical operations, such as Laparotomy (opening the abdomen), Amputation of limbs, Embryotomy, operations of the intestines, Lithotomy and various plastic operations have been described with such precision that the anatomical knowledge which this presupposes could not have been of a mean order. Clear references to the circulation of blood occur in the works of Charaka and Bagbhata. Dissection of the human body has been enthusiastically recommended by Sushruta and Bagbhata and there can be no doubt that the practice was in vogue in the palmy days of India's intellectual sunshine. As Dr. Hoernle has very aptly remarked—' Probably it will come as a surprise to many, as it did to myself,

to discover the amount of anatomical knowledge which is disclosed in the works of the earliest medical writers of India. Its extent and accuracy are surprising, when we allow for their early age—probably the sixth century before Christ and their peculiar methods of definition '. Ever since the invasions of the Greeks (327 B.C.), much of the past glory was lost. The real wonder is—how so much has yet survived. . . . In Anatomy, the loss has been very heavy. All original works having been lost, Hindu Anatomy now survives only in a few meagre and desultory dissertations in the so-called ' Anatomical sections ' (Sharirasthana) of the larger Ayurvedic works now extant. The Tantric Literature, which elaborately describes the Brain, the Spinal Cord, the Sympathetic chains of Ganglia and the different Plexuses of nerves (Nadi) is now shrouded in so much mystery that few people suspect that there is such a world of anatomical facts concealed in it." The best way of bringing Ayurvedic Anatomy up to date is to do what Dr. Kaviraj Gananatha Sen himself has done, *viz.*, to re-edit and re-write Ayurvedic Shareeram in the light of modern Western Anatomy, which has now been rendered precise and comprehensive, by the patient labours of a succession of devoted anatomists. The Descriptive Anatomy of the West may

well be treated as a supplement to or commentary on the brief or summarised Texts of the existing Ayurvedic Literature while there are many teachings in Ayurvedic Shareeram (Anatomy and physiology) which may be considered to continue from or begin where the Western teaching ends. I venture to urge that Western scientists may make an understanding study of the 'Chakras' (centres of consciousness), the Pranas, the 'Marmas' (Vital points), and the many other Ayurvedic details given in our ancient Literature. It seems to me that here, as elsewhere, there is vast scope for both Ayurveda and Western Medicine, to exchange thoughts so that each may learn from the other what the other can teach.

ETIOLOGY AND PATHOLOGY

ETIOLOGY

In the consideration of the Panchabhuta theory of Matter, I compared the subjective analysis of Ayurveda with the objective analysis of Western Science and pointed out that the subjective analysis has the advantage, specially from a philosophical standpoint, of having a complete theory adequate for all time (the attribute of Sanatana). I also pointed out that while the Western analysis which divided Matter into 82 chemical elements till a few years ago had to go on changing this number as new elements came to light from time to time so that the number stands now at 94. Hindu thought analysed Matter into five divisions which would prove adequate for all time needing no change from time to time and in one or other division of which ready-made accommodation existed not only for all things known in the past and the present but also for those that may become known hereafter. It was also pointed out that the

enunciation of theories having this quality of Sanatana —adequacy for all time—is a general feature of Hindu Analytical thought which meets us all throughout our studies. The subject of Etiology provides us with a striking illustration of this characteristic feature of Hindu Analytical thought. That causation of diseases is by agencies outside of oneself is common ground between Etiology of both Ayurveda and Allopathy; but the analysis of such agencies by Ayurveda and Allopathy shows the characteristic features differentiating the two view points. An analogy may perhaps serve a useful purpose in this context. Let us suppose we wish to classify the various invasions of India; we may do it in two ways: in one we may classify the invasions as those by either land or sea or air; in the other we may classify them as those by the Greeks, the Scythians, the Muhammadans, the Europeans and so on. The first classification is all-comprehensive and applicable for all time; because, all invasions must take place in one or other of these three modes—singly or combined; but, the second classification is applicable only to the present and the past and that too, only so far as it is known; and if there are new invasions in the future by people other than those given above, the list will have to be added to, whereas, in the first case, all future invasions will

naturally go in under one or other of the three categories that have been laid down once for all and for all time as it were. This is the complete method followed by Ayurveda in its Etiological analysis while the Allopathic analysis follows the second method of the analogy given above which does not give any assurance of completeness or adequacy as does the first because its contents will have to be supplemented by additions if, in the future, there are invasions other than by peoples noted in the analogy given above.

AYURVEDIC ETIOLOGY

Etiology or the causation of disease, according to Ayurveda, may be summarized thus [1] :—Health is when a person's 'Dhatu-equipoise' is normal, and ill-health, when it is abnormal ; Vata, Pittha and Kapha, which are spoken of as Dhatus when in their normal equipoise are referred to as Doshas (Faults) when their equipoise becomes abnormal ; because in this condition of abnormality, they vitiate or cause faults in the secondary Dhatus like Rasa, Rakta, etc. The

[1] For much that is contained in the following, I am indebted to the authoritative evidence (written in Sanskrit) of the (late) Venerable Swami Lakshmi Ramaswamiji Acharya of the Government Ayurvedic College, Jaipur.

essence and *sine qua non* of ill-health or disease is the abnormality of Dhatu equipoise—Dosha Vaishamya —which is caused by certain extrinsic causes like Mithya Ahara and Vihara (faulty diets and practices) and certain intrinsic causes coming under the category of Guna Vaishamya (disturbance of the normal equipoise of the Gunas—Rajas, Satwa and Thamas). The analysis of all possible causes of Disease are summarised in certain time-honoured aphorisms, admirably concise and precise and yet highly expressive and all-comprehensive. Such aphorisms are liable to suffer badly in translations. Further, we have to approach the subject in the same way that the Ancients approached it, if we are to understand the full significance of the phraseology of these aphorisms which may sound quaint in the ears of those used only to modern phraseology. The key-words used in these aphorisms for classifying all possible causes of every kind and degree—all causes which are already known as well as those which may become known hereafter—are the following :

(i) *Asathmyendriyartha Samyoga* (असात्म्येन्द्रियार्थ-संयोग)—*Incompatible correlation of Indriyas (senses) with their Artha (objects).*—Ayurvedists explain this as follows: Bhautika Dravyas (Panchabhutic substances or Physical objects) cannot make for health or

ill-health without coming into contact with our bodies. Such contacts can occur in only five ways—that is through the five senses (Indriyas) which are our normal channels for contacting all objects already known as well as those which become known hereafter. These five ways of contact of Indriyas with external objects can show abnormalities of three kinds *viz.* Atiyoga (excessive Degree of correlation), Heenayoga (Defective degree of correlation) and Mithya Yoga (Correlation of faulty quality). The underlying idea of this classification may be stated thus: all external objects that can invade our bodies to cause diseases—whether they be physical agents, chemical substances, microbes, parasites or any other—can enter our bodies in only five ways—through the channels of our five senses, and each of those five ways or modes of entry may exhibit three variations from the standpoint of their capacity to cause diseases *viz.* Variations from normal by way of excess (Atiyoga), defect (Heenayoga) or qualitative change (Mithya-Yoga). Under this classification, diseases caused, say, by blinding light falling on the retina and injuring the eye, deafening sounds falling on the ears and injuring the ears, foods and drinks taken in injurious excess etc., would be described as diseases caused by Atiyoga (excessive contact or

correlation of light, sound, foods and drinks, etc., with the senses of sight, sound, taste, smell and touch.) Similarly, diseases caused by abnormal quantitative defects instead of by abnormal increases as in the examples given above would be described as diseases caused by Heenayoga (defective contact or correlation) of light, sound, foods and drinks etc., with senses of sight, sound, taste etc. Diseases caused by injurious rays, foods and drinks, etc., would be described as caused by Mithya Yoga (qualitatively abnormal correlations or contacts) of sight, foods and drinks etc., with sense of light, taste etc.

(ii) *Prajnaparadha* (प्रज्ञापराध)—*Faults of understanding*, also known as Karma. The phenomena coming under this category are classified under three heads, *viz.*: Shareeram (relating to body), Manasam (relating to mind), and Vachikam (relating to speech) and these become causes of disease when faulty understanding causes excessive, defective or perverted correlations of such phenomena (Atiyoga, Heenayoga and Mithyoga) resulting in abnormality of Dhatu-balance.

(iii) *Parinama* (परिणाम) also known as Kala. This is quite a technical word which has reference to seasonal and other phenomena governed by the time-factor

(Kala). If, by excess, defect or perversion (Atiyoga, Heenayoga, or Mithya Yoga) they become abnormal, then, they may cause disease, by way of causing Dosha Vaishamya (abnormality of normal ' dosh-equilibrium '). Thus, ill-health may be caused by such agencies of abnormally severe or mild seasons, the prevalence of winter conditions during summer or of rain during the non-rainy season and so on. This category also includes karmic causes which are stated to cause manifestation of disease at the time of Karma Vipaka —the time when the Karmic seeds become mature or ripened by Parinama.

(iv) *Guna Vaishamya* (Abnormality in the equilibrium of the Gunas—a term which has been already explained.) Of the three Gunas, Satwas, Raja and Tamas, it is held that only Rajas (stimulator) and Tamas (inhibitor) can become Doshas (or Faults) while Satwa (Balance or Harmony) is always a Guna and never a Dosha. This category has reference to *mental* doshas (Manasa Dosha). Cupidity, cruelty, anger, rage, jealousy, indolence, self-indulgence etc., are mental Doshas or Faults. The time has gone by when some well-meaning students of Western Medicine used to say that Ayurveda unscientifically mixes up Ethics and Medicine in laying down, as it does, that unethical conduct (for example, getting into a

fit of anger, rage or jealousy) was one of the causative factors of disease. Modern research is now confirming the ancient teaching ; we now know that feelings like anger and rage can set up, and be set up by abnormal conditions of the physical body. " Emotion causes " says Crile " a more rapid exhaustion than is caused by exertion or by trauma except extensive mangling of tissue, or any toxic stimulus except the perforation of Viscera." " Cannon has shown " says Professor Goddard, " that a stimulation of the adrenal gland produces all the phenomena of anger and rage, and conversely, the production of anger and rage by any other method affects the secretion of the adrenal glands. . . . There are a number of other such glands . . . There is no reason to doubt that some, if not all of these other glands may have similar relation to emotion. It would therefore appear that far from ridiculing our Ancients as persons who knew no better than to mix up health and ill-health with the practice and non-practice of the social and moral virtues, modern science itself may well be prepared to preach an " ethical " sermon, somewhat in the following strain : " If you habitually allow yourself to get into fits of anger or rage, the result will be, among other things, unhealthy stimulation of your adrenal glands, leading perhaps to neuresthenia. If you

habitually get into temper as often as you can, you will surely have to pay the penalty for it in the shape of dyspepsia and such other troubles. If on the contrary you are ever affectionate and cheerful, radiating sunshine wherever you go, you may safely trust to your own glands—both the ductless and the ducted, to keep you ever young and in radiant health. In brief, judged even from the most materialistic standpoint of sheer physical well-being it will pay you exceedingly well to practise altruism, sobriety, cheerfulness, affection and other social and moral virtues, while avoiding like poison, passion, hatred, jealousy, anger, rage and other vices. Go about doing good, avoiding evil, and practising Sadachara (right social and moral conduct) as Nithyakarma (daily routine) and I promise you the very best of health and therefore of happiness."

ALLOPATHIC ETIOLOGY

As regards the Allopathic analysis of causes of disease, it looks at the invasion of the body by disease—causing agencies from an objective standpoint and groups them under certain categories suggested by causes of disease known at the time of grouping. When hitherto unknown causes become known at

any time, the grouping of categories will have to be changed if the newly known cause or causes could not go under any of the categories of the existing grouping. Thus, the grouping of causes of diseases as framed in days before the microbic causation of disease became known, became inadequate after it became known.. Similar inadequacy resulted when the causation of diseases by excess or deficiency of Vitamines and Endocrine secretions became known. Even the latest available grouping given in "A Text-book of Pathology" by Prof. William Boyd (page 17 of 1945 edition) cannot now be considered adequate or complete. The following is the grouping as given in the above reference :—(1) congenital or hereditary tendencies or defects with which may be included the difficult subject of constitution ; (2) insufficiency of food and oxygen, including those conditions known as deficiency diseases ; (3) Infections by the various pathogenic micro-organisms ; (4) animal parasites ; (5) trauma ; (6) physical irritants ; and (7) chemical poisons. The reason why this grouping cannot now be considered adequate or complete is that it cannot take in those emotional and mental phenomena which, as shown above, have now been definitely established to be causative factors of certain diseases.

COMPARISON OF AYURVEDIC AND ALLOPATHIC ETIOLOGY

For comparing the Etiological analysis of Ayurveda and Allopathy in regard to disease—causing agencies invading the body, I gave, at the beginning of this topic, the analogy of invasions of India being classified in two ways *viz.*, either as invasions by land, sea or air or as invasions by Greeks, Scythians, Muslims etc. I also said that the Ayurvedic analysis is on the lines of the former classification. Its analysis of all possible disease-causes invading the body under the categories of Indriya-Artha-Samyoga, Prajnaparadha, Parinama and Guna Vaishamya is therefore complete, comprehensive and adequate for all time, just as the classification of invasions of India by Land, Sea and Air is complete, comprehensive and adequate for all time, as all invasions in the past, present or future must come under one or other of these categories singly or combined. The Allopathic analysis given above is like the second classification of invasion of India given in our analogy namely invasions by Greeks, Scythians, Muslims—a classification which would necessarily prove incomplete or inadequate if new invasions of India occur in future by people other than those noted in the analogy. So too the Allopathic

analysis would necessarily become inadequate when new causes of disease not coming under existing grouping become known. The only difficulty that may stand in the way of the logical perfection and the philosophical completeness of the Ayurvedic Analysis being appreciated is the peculiar phraseology used by the ancient authors of our Ayurvedic classics. If an approach is made with an understanding study of such phraseology the reward would be great indeed.

NIJA AND AGANTU CAUSES AND DISEASES

There are two modes or forms in which the causes of disease may exist in relation to disease. In one (called the Nija form) the extrinsic cause first sets up abnormality of Dhatu-equilibrium which results in the painful condition called disease, while, in the other (called the Agantu form) the painful condition is first produced, and is followed later by the manifestation of abnormal Dhatu-equilibrium. Injury, poisoning, parasitic germs, etc., come under the latter heading. Though diseases are thus classified as Nija and Agantu, yet, after disease is manifested, they are similar in their clinical manifestations; for, unless Agantu causes set up abnormality of Dhatu-equilibrium, the disease cannot have any real or continued existence. It is

not every injury (even though painful for the time) that produces disease ; some may be quite ephemeral and pass off without eventuating in disease ; it is only when body-conditions are such that the Agantu cause actually produces the manifestation of Dhatu-morbidity that it can be spoken of as being the cause of disease. Hence it follows that abnormality of Dhatu equilibrium is the essential feature of both Nija and Agantu diseases.

AYURVEDIC PATHOLOGY

Ayurvedists trace the process of development of Dosha-Vaishamya—the abnormality of Dhatu-equilibrium—through the following six stages or *Kriya Kalas*, as they are sometimes called :

(1) *Sanchaya or Chaya (accumulation)* is the stage when the dosha accumulates in a particular part as *stagnant Dosha*.

(2) *Prakopa (Excitation).*—When the stagnant dosha has accumulated and permeated a structure, there is excitement from aversion towards similars and attraction towards contraries. This is known as Prakopa (excitation), which is also explained as Prarambha rupa or *initial stage of disease*.

(3) *Prasara (spreading).*—This is the stage where the excited dosha extends to another part.

(4) *Sthana Samshraya (taking up another location).*—This is the stage where the excited dosha, having extended to another part, becomes located there, causing beginnings of specific diseases of those structures (*e.g.*, diseases of blood, stomach, bladder and so on).

(5) *Vyakti (manifestation).*—This is the stage where the abnormality of Dosha-equilibrium results in the fully developed form of disease.

(6) *Bheda (variation).*—This is the stage where diseases become chronic, incurable, etc. The importance of recognizing this stage lies not only in its being a very valuable aid in prognosis, but also in the fact that when diseases go to this stage, they may act as predisposing causes of other diseases, or may so vitiate the germinal elements as to make for the esse of congenital or hereditary diseases in the offspring.

THE GERM THEORY OF DISEASE—THE SEED AND THE SOIL

There seems to be a general idea that the germ-theory of disease which plays so important a part in modern western medicine is not known to Ayurveda ; I propose to examine the question at a little length as great importance seems to be attached to it in certain scientific circles : my argument will be that it is

not true to say that the germ-theory of causation of certain diseases was not known to Ayurveda, and that what is true is that it did not, and does not, occupy in Ayurveda the all-important position which it does in modern western medicine.

We have seen that, according to Ayurvedists, causation of disease is two-fold, *viz.*, extrinsic (Bahya) and intrinsic (Abhyantara), and that parasitic germs are mentioned among the extrinsic causes, under the sub-head 'Agantu,' along with Traumas and poisons of all kinds. There are two ways in which Agantu diseases manifest themselves in the body, *viz.* (1) independently (Svatantrena) and (2) by infection or contagion (Sankaramanena). Leprosy, other Kushtas and infectious diseases generally are instances of diseases conveyed by contagion. Pathogenic organisms (Krimis) are broadly divided into two classes, *viz.*, those which are visible to the naked eye and those which are not; thus, Sushruta, in the chapter entitled Krimi-Roga-Pratisheda, speaks of twenty kinds of Krimis, of which the first thirteen kinds are mentioned as being visible to the naked eye, while Keshada, Romada and others are said to be not so visible. (केशादादयास्त्वदृश्यास्ते). Vaghbhata is also clear as to the causation of Kushtas by invisible organisms; his significant reference to them as living Anoos

(जन्तवो अणव:) is unmistakable, as also his statement that some of them are invisible because of their minuteness (सौक्ष्म्यात्केचि-ददर्शना:) (Ashtangahridaya, —Nidanasthana, Chapter VII). While there can be no doubt that the existence of microscopic organisms as also their definite causative relationship to certain diseases was distinctly recognized by Ayurvedists, yet, it is clear that they did not attribute to germs the all-important role, assigned to them by orthodox western scientists of to-day; they merely looked upon the germ as one among the many Aganthu causative factors, capable of producing disease, if the soil or field (Kshetra) was suitable for the growth of the germ-seed. It is when the bodily constitution was undermined by the non-observance of the Laws of Health such as Ritucharya (Hygienic rules for various seasons of the year), Dinacharya (Hygienic rules for daily conduct), Brahmacharya (Hygienic rules of celibacy or regulated sexual life) and so on, that the Kshetra (or soil) became suitable for the growth of germ seeds, which were powerless to do any mischief in the case of those persons who led pure and healthy lives, because the Kshetra (or soil) was unsuitable for the germination and growth of the seed. Looked at from this standpoint, germ-seed is merely one among the many

external causative factors of disease, like Trauma, poisons, nutritional abnormalities and so on. This fact is, in a way, recognized by Western Medicine also; for, we still speak of large groups of diseases, like Deficiency diseases, Nutritional diseases, Tumours, Malformations, and so on, whose causation is not attributed to germs at all, although some germ-enthusiasts are hard at work to find out causative germs for all diseases in general; it is because of the undue importance attached to germs, that it sometimes appears as though the germ theory was the whole of our Western theory of causation of diseases, while the fact is that it is but one among the many theories known to Western Medicine. Thus, lack of vitamines is held to give rise to a group of diseases like Rickets, Scurvy and Beri-Beri; abnormalities of internal secretions, to other diseases, like Myxoedema, Addison's disease, Acromegaly, etc.; then again we have Tumours, Malformations, etc., whose causation has not yet been satisfactorily known. Ayurveda prefers to have but one theory, *viz.*, the Thri-dosha-theory, as sub-heads of which it has not only the germ-theory but also every other theory mentioned above. Hence, when people talk of 'the Thri-dosha-theory *versus* the germ-theory', they are making the mistake of comparing the whole

with a part; then again, there seems to be such exaggerated views of 'germ-theory' that it is worth while re-emphasizing the fact that, even in its own line, the present germ-theory is not the last word in medicine and that it is applicable to only one group of diseases. If one hundred people are exposed to the same bacterial infection or seed, it does not follow that all will contract the disease; in addition to the bacteria, you require a particular condition of the tissue—soil where the bacteria can take root and thrive. It seems as though the Thridosha-theory looks at the question more from the standpoint of the soil, while the germ-theory looks at it more from the standpoint of the seed. "Keep out the seed—away with all germs and you are safe" —that is the slogan of the germ-enthusiast. "It seems impracticable to keep out the germ-seeds which are ubiquitous. Therefore keep the soil in such a condition that no seed can grow, even if it gets in there." So urges the Ayurvedist. Moreover, can we definitely say that the Ayurvedist is wrong, even if he chooses to assert that the bacteria are the *result*, rather than the *cause* of diseases? Sir James Goodheart, an honoured name wherever Western Medicine is known, stated in the course of Harveian Oration for 1912: "Pathology is still shifting. We

have not yet reached finality. Even *bacteria are probably results and not causes.*" From what one may gather from the most recent Western literature on this subject, it seems as though there is now—that is, even twenty six-years ago when this Memorandum was first written—a distinct tendency to get away from the present position of attaching exaggerated importance to the germ-seeds and to take up instead more or less the Ayurvedic position of attending to the 'soil' and keeping it in such a condition that the germ-seed cannot germinate or thrive therein. This new tendency is apparently gaining ground so fast that even the lay press has begun to interest itself in the matter, as may be gathered from the following extracts from a remarkable leading article in the *Times* (London) on the germ-theory of disease: "A decade ago it was confidently affirmed that if the 'seed' was present, the noxious plant could be counted on to grow; in other words, that infection was the one essential preliminary to illness. This idea led to the active campaigns which were organized against various bacteria, the hope being that their abolition would result in the abolition of the disasters occasioned by them. Medicine has largely abandoned that hope, for it is now certain that the 'soil' as much as the 'seed'

determines the outcome. There are, in fact, disease-proof individuals and other individuals whose susceptibility is much greater than normal. Susceptibility, too, can be won or lost. The minds of many workers are turning to this aspect of the subject, for it is already abundantly clear that control of human resistance offers a brighter future than direct attempts to eliminate disease. For example, it is easier to replace sandstone grinding-wheels by wheels made of emery than to stamp out the tubercle bacillus—yet the effect, it would seem, of the easy method is similar to that which the vastly difficult one might be expected to produce. It is easier, too, to supply children in winter with an adequate supply of butter or other animal fat than to sweep their nurseries clear of the germs of pneumonia or bronchitis. The butter in this case makes the 'soil' unsuitable for the 'seed'." It will thus be seen that the Ayurvedic conception of germ-caused diseases, as of diseases generally, is essentially a sound one, even in the light of the most recent findings of Western Science.

PHARMACOLOGY

IMPORTANCE OF STUDY

There are many well-meaning practitioners of Western Medicine who, while admitting readily, and even enthusiastically, that there are a good many drugs and medicinal preparations on Ayurveda which are of decided therapeutic value, are nevertheless of opinion that it is not necessary to study Ayurveda to know the use of these remedial measures and that practitioners of Western medicine may well be trusted to use them in the light of their own pathology, diagnosis, pharmacology and the like. This, to my mind, seems an unscientific procedure, which, if really put into practice, may easily be attended with dangerous and even disastrous consequences, more especially in the case of those highly potent remedies used by practitioners of the Siddha system; such use of indigenous drugs and remedial measures would be as unscientific and dangerous a quackery, as, for instance, the use of vaccines, sera, and hypodermic remedies

by Ayurvedists who have not learnt the science on which their use is based, though, by a little practice, they may easily learn the art of hypodermic or even intravenous injections. If this is borne in mind, one can easily understand why Ayurvedists object so strongly to the value of Ayurvedic or indigenous drugs being tested and judged by persons who have not made any understanding study of Ayurveda. But, without such a study, the use of Ayurvedic remedies by practitioners of Western medicine may really be, as I said before, unscientific and dangerous quackery.

DRAVYA-RASA-VEERYA-VIPAKA-PRABHAVA PHARMACOLOGY

According to Ayurvedic Pharmacology the several factors which govern the action of drugs are the following :

(1) *Dravya.*—This has reference to the Panchabhutic constitution of medicinal substances, according as they are Parthiva (" Earthy "), Apya (" Watery "). Thaijasa (" fiery "), Vayaveeya (" Airy ") or Akasheeya (Etheric). As we have already seen in the discussion of the Panchabhuta theory, the significance of these terms is not at all brought out in their literal English translations. To the Physicists and chemists of Hindu

thought, these terms denote the five classes of objective Matter related to the subjective sense-impressions resulting from their contacts with our five Indriyas (or senses). To the Ayurvedists, however, they mean far more; in addition to the primary meanings given by Physicists and Chemists, they have added certain secondary meanings relating to their gunas (attributes) and karma (actions) which are of great significance to them from the standpoint of physiological actions and therapeutic uses, as may be gathered from the following illustrative description of a Thaijasa ("fiery") substance. "A thing or substance, which is heat-making, pungent and keen, subtle in its essence, permeates the minutest capillaries, and is dry, rough, light, and non-mucilogenous in its character and has preponderance of Rupaguna and a Resa ("Taste") which is largely pungent marked by a shade of saline, is called a substance of the dominant principle of fire (Taijasa). Such a thing naturally evinces an up-coursing tendency in the body, produces a burning sensation therein, helps (the process of Digestion, etc.) and the spontaneous bursting (of abscesses etc.), increases the temperature of the body, strengthens the eyesight, improves the complexion and imparts a healthful glow to it." (Sushruta-Sutrasthan—Chap. 41). Similar descriptions

are given in regard to other classes of Panchabhutic substances.

(2) *Rasa*.—A technical term, rather difficult to translate, though it is generally rendered as 'taste'; but it means much more than what is conveyed by its literal meaning. It has reference to the direct and immediate action of a drug when it comes in contact with the organ of taste. As in the case of Panchabhutic Dravyas, the term "Rasa" also has certain secondary meanings which are of great significance from the physiological and therapeutic standpoints.

(3) *Veerya (Potency)*.—This is of two kinds—Ushna (literally 'hot') and Sheeta (literally 'cold'); these literal translations are very unsatisfactory, because they emphasize the temperature factor which is not intended in the original; this becomes more obvious when I say that, according to some authorities, 'Veeryas' are not of two kinds only as mentioned above but of eight kinds—Ushna, Sheeta, Snigdha, Ruksha, Vishada, Pichchala, Mridu and Theekshna. These technical terms are, however, not to be interpreted in the sense of their literal English renderings. The term 'Veerya' seems to have reference to the ultra-chemical actions of drugs. Ayurvedists take very great pains, to extract, as it were, the Veerya factor

of drugs, which, they say, is capable of producing the desired results, overcoming the action of both Rasa and Vipaka.

(4) *Vipaka.*—This has reference to the action of a drug after it has undergone digestive and assimilative transformation. Vipaka can be used to overcome the action of Rasa but is itself overcome by Veerya (or potency). It is generally held to oe of three kinds—Katu (pungent), Amla (sour), Mathura (sweet).

(5) *Prabhava (specific action).*—Where two drugs show agreement in respect of their 'Rasa', 'Veerya' and 'Vipaka' but are yet seen to show a difference in respect of their therapeutic action, such a difference is said to be due to 'Prabhava.' As an example of 'Prabhava', I may take the following from Charaka-Sutrasthan—Chapter XXVI—"Chitraka (Plumbago Zeylanica) is Katu (pungent) in Rasa and Vipaka, and Ushna (hot) in Veerya. So is Danti (Baliospermum Montanum, or Croton Polyandrum). But Danti operates as a purgative, while Chitraka does not."

As in their analysis of Matter and Etiology which have already been considered and of Diagnosis and Treatment to be considered hereafter, so also in their analysis of pharmocological principles, the Ayurvedists seem to have aimed at the formulation of certain general laws and classifications, which, possessing,

as they all did, a characteristic element of completeness and adequacy for all time, helped their followers, not only to understand clearly what was known to them already but also to get a general grasp of things, as they would become known to them from time to time. Take, for instance, their conception of 'Rasa' or 'Tastes.' To the Ayurvedist, the 'Rasa' of a drug denotes much more than what the term 'Taste' conveys to the student of Western medicine; there are certain general laws, by the application of which, he associates every 'Rasa' or 'Taste' with a number of definite physiological and therapeutical actions in terms of 'Dosha,' 'Veerya,' 'Vipaka' and so on, so that by a knowledge of these laws, he claims to be able not only to utilize an appropriate Rasa or combination of Rasas in the correction of a particular type of Doshic morbidity but also to infer by the 'Rasa' of new substances that become known from time to time, what their physiological and therapeutical properties are likely to be. To take an analogy from Western medicine, I may instance the case of 'Bitters,'—a term, with which are generally associated certain therapeutic properties, such as, for example, the property of acting as a carminative or a febrifuge, etc.; but, such examples are only isolated features of Western medicine, while, in Ayurveda the

subject is thoroughly systematized into regular scientific categories ; all articles of diet, drug, etc., have been systematically classified under the six primary tastes—Madhura (sweet), Amla (acid), Lavana (saline), Katu (pungent), Thiktha (bitter), and Kashaya (astringent), so that, by knowing under which of these groups an article of drug or diet comes in, one can get a general idea of its physiological and therapeutic properties. Similar classifications exist for Dravya (as seen above), Veerya, and Vipaka ; and there are also subsidiary rules governing cases where there is disagreement between indications of 'Rasa,' 'Veerya,' etc. All known articles of diet and drug, and even the various phases of human activity (such as, exercise, sleep, study, bathing, and every other conceivable phenomenon) are systematically classified, according to their physiological and therapeutic properties. There is a wealth of valuable information on these topics given in Ayurvedic classics like Charaka and Sushruta, relevant portions of which may be studied with profit by those interested in the subject.

DIAGNOSIS AND TREATMENT

"EXAMINATION BY THE SENSES AND INTERROGATION"

In general, Ayurvedic methods of Examination for purposes of Diagnosis are similar to those of Western Medicine ; but the method of approach as well as the nomenclature adopted are from the subjective standpoint so that all features that Western Medicine describes from an objective standpoint as "Examination by Inspection", "Examination by Palpation", "Examination by percussion," "Examination by ausculation", "Examination by the Microscope" etc., would all come subjectively under one comprehensive category, "Examination by the senses" whether such examination is by sense aided by instruments or by an unaided sense. Thus, Examination by inspection, palpation, percussion, ausculation, microscopy etc. are all "Examination by the senses"; in some cases, the sense may be aided as, for example, the sense of sight in Microscopic examination, the sense of hearing in Sthethoscopic examination and so on ; or, it may be unaided as in the case of ordinary inspection, palpation, etc. ; but whether aided or unaided, it is all

" examination by the senses "—a concise and precise description which is yet comprehensive and adequate enough to serve as a formula for all time ; for, we cannot conceive any method of examination, whether direct or instrumental, whether known already or may become known hereafter, which will not come under the description " Examination by the senses ", singly or combined, aided or unaided. This feature of enunciating all-comprehensive formulæ adequate for all time is a striking feature of Hindu analytic thought generally, as has also been noticed in all other divisions of our present study. In addition to " examination by the senses ", there is also mention of " Prasna " or interrogation so that the full formula " Examination by the senses and interrogation " will include all possible methods of examination whether known already or may become known hereafter. These several points are well brought out in the following extract from the evidence of the late Kaviraj Yamini Bushan Ray, M.A., M.B. & C.M., a prince of practitioners learned in both Ayurveda and Western Medicine : " The diagnosis of diseases is six-fold—by means of the five senses and also by interrogation. Western Medicine, looking at things from without, designates its diagnostic methods by the terms inspection, palpation, etc., but, our ancients,

ever looking at things from within, referred them all to the five senses and to interrogation, which (interrogation) was a very comprehensive and highly suggestive method, including, as it did, references to all the numerous relevant factors of diseases such as desa (country), kala (time or seasons), jati (tribe), satmya (compatibility, that is to say, whether correlation with particular climate, country, season, previous illness, tribal peculiarities, etc., is or is not compatible to patient), athanka (the mode of onset), vedana samuchraya (the mode of development of ailment), balam (constitutional strength), deepagnitha (state of digestion and assimilation), mutra-pureeshadi (state of urine, fæces, etc.,) and so on. If any physician of any climate or country follows the detailed maxims laid down for the thorough examination of not only the disease, but also of the patient, which examination was particularly insisted on by our sages, as being essential both for diagnosis and treatment, he is sure to do well by his patient and bring credit to his science and art.''

ASHTASTHANA PAREEKSHA—THE EIGHT SPECIAL EXAMINATIONS

In every routine investigation of a case, the Physician is expected to pay special attention to the

examination in respect of the following eight particulars :

(1) *Nadi* (*Pulse Examination*): In Western Medicine, examination of the pulse is undertaken primarily for finding out certain features of the circulatory system ; but, in Indian Medicine, it is undertaken to find out the state of disturbed doshas (Vata, Pitha, and Kapha) and of vital phenomena indicative of particular Roga (disease) and prognosis with reference to a particular Rogi (sick person). Examination of the Nadi seems to have been cultivated with special assiduity by Siddha physicians who look upon "Nadi" as indicative of the activities of the Jiva (Life Principle) in the individual body and its orientation to Cosmic forces of Vayu, Moon and Sun, manifesting as Vayu Nadi, Chandra Nadi and Surya Nadi, corresponding to Ida, Pingala, Sushumna of our yogic and tantric Literature. It is difficult to explain these things in the language of Modern Medicine because orthodox physiology does not recognise the existence of any of these life-principles.

(2) *Sparsha* (Tactile indications such as: "heat", "cold", etc.)

(3) *Rupa* (*Visual indications* such as: lustre, colour of skin, etc.)

(4) *Sabda* (Voice indications such as : voice being excited, strong, weak, etc.)

(5) *Pureesha* (Fæces indications such as : constipation, diarrhoea, colour, etc.)

(6) *Netra* (Eye indications such as : various colours of the conjunctiva, local swellings, etc.)

(7) *Mutra* (Urine indications such as : colour, lustre, clarity, turbidity, density, etc.) The examination of urine is cultivated with special assiduity by our Unani Physicians.

(8) *Jihwa* (*Tongue indications* such as : colour of coating, existence of cracks, undue dryness, undue moisture and such other features.)

NIDANA PANCHAKAM—FIVEFOLD INVESTIGATION OF DISEASE

The methods of investigation of Diseases are usually described under the following five heads beginning with Nidana and hence designated as Nidana Panchakam :

(1) *Nidana.*—First comes the investigation of 'nidana' or the root-cause of diseases ; that is to say, of the particular causative indiscretion, such as, bad food, bad water, indulgences, excesses and the like. This gives us clues to diagnosis and prognosis. But, as one nidana may possibly be at the root of

more than one disease, Nidana alone cannot help us to diagnose diseases.

(2) *Purvarupa.*—Next we proceed to investigate purvarupa, or the prodromata. This investigation helps the physician to correlate particular doshic derangement with a particular group of prodromata and also gives him some clue to prognosis.

(3) *Rupa.*—Next comes the investigation of rupa or symptomatology, by means of which the physician is enabled to judge the special features of the developed stage of disease, of doshas, dushya etc., which indicate whether we have to deal with morbidity of one dosha, two doshas (dwandva), or all the three (sannipata) ; whether it is an affection of rasa, rakta, mamsa, asthi, or any other dhatu or dushya, and so on. The study of signs and symptoms was apparently pursued by ayurvedists with remarkable diligence and skill.

(4) *Upashaya.*—Next in order comes what is termed Upashaya, which is really a form of diagnosis by applied therapeutics, a measure not unknown to Western medicine. Let us say, the question is whether a particular ailment is due to the derangement of vata. We are in doubt. We then prescribe a diet, exercise or any other remedial measure known to cure this suspected derangement, which is then

either ameliorated or aggravated. If it is ameliorated, then the hypotheticated proposition is confirmed. If not, it is rejected.

(5) *Samprapthi.*—Finally, we have samprapthi, a term which is generally translated as pathology ; but it is really much more, because its investigation is conducted with a special eye to prognosis. It has reference to the following features :—

(1) *Sankya or number.*—That is to say, the number of varieties or types in which diseases may manifest themselves : thus—fevers in eight types, gulmas in five, leprosy in seven, and so on. (2) *Pradhanya or predominance.*—That is, the predominance of particular dosha or doshas. (3) *Vidhi or order or classification.*—That is with reference to either the two-fold causes, *viz.*, idiopathic (nija) or extrinsic (aganthuka), or to the three-fold classification of tridosha, or to the four-fold classification of curable, incurable, mild and severe types. (4) *Vikalpa or possible alternatives*—that is, the ascertainment of the measure in which the doshas are excited in the combined doshic triad. (5) *Time of energising (balakala).*—This is with reference to the time-factor, which energises diseases and makes them either atibala, madhyabala or heenabala (severe, moderate or mild) *e.g.*, the seasons, the day, the night, the hour of eating, etc.

TREATMENT

CATEGORIES OF TREATMENT

तदेव युक्तं भैषज्यं यदारोग्याय कल्पते
सचैव भिषजां श्रेष्ठो रोगेभ्यो यः प्रमोचयेत्

(Charaka)

That alone is the right treatment, which makes for health ;
he alone is the best doctor who frees us from diseases.

To provide for our people the best available medical aid that it is in our power to give should be the supreme objective of us all, engaged in the study, teaching and practice of Medicine. To do our part in achieving this objective, it is very necessary that we should keep ourselves constantly up-to-date and in continual touch, to the utmost extent that it is possible for us to do, with the progress that is made all over the world. The adoption of such a course would come naturally and easily to followers of Ayurveda with its fundamental catholicity

of outlook and comprehensiveness of approach. In many places in previous sections, I have pointed out that a characteristic feature of Hindu Analytical thought that strikes us everywhere in our studies is its flair for enunciating theories so complete in their conception, so perfect in their logic and so satisfying from a philosophical standpoint as to prove all-comprehensive and adequate for all time—a feature which strikes us as much in our study of treatment as in other studies. While firmly rooted in its time-tested Siddhanta of Thridhoshic Physiology, Pathology and Therapeutics, it has nevertheless provided ready-made niches or mansions to which therapeutical practices of proven utility from everywhere and of all times can be readily welcomed at all times. To make this statement clear, I give below the all-inclusive categories under which Ayurveda arranges all possible modes of treatment (Chikitsa) of all times—past, present and future. Firstly, it states that two-fold are methods of treatment (Chikitsa) namely Vipareetha Chikitsa (Treatment by contraries) and Thadarthakari Chikitsa (Treatment by similars). Each of these show a natural three-fold subdivision as indicated below :

(A) *Vipareetha Chikitsa or Treatment by Allopathy in the sense of treatment by contraries or opposites.* This is of three kinds, namely: (1) *Hetu Vipareetham*

or treatment by measures—Medicines (Aushadha), Diets (Anna) and Life activities (Vihara)—which are contrary to *Hetu* or cause of disease and operate for its removal ; (2) *Vyadhi Vipareetham* or treatment by measures which are contrary to *Vyadhi* or disease (which is the effect) and operate for its removal ; (3) *Hetu-Vyadhi Vipareetham* or treatment by measures which are contrary to both *Hetu* (cause) and *Vyadhi* (disease) and operate for their removal.

In certain cases, the cause may disappear after producing the effect namely disease. In other cases it may persist and make for continuance or recurrence of disease. In the former case, only the disease has to be dealt with. In the latter case both cause and disease have to be dealt with. In some cases, it may be sufficient to deal with only the cause. If a burning lamp is so near the skin as to cause burns unless removed, the development of *Vyadhi* or disease called burns may be dealt with by removing the lamp (cause) to a safe distance. If, however, the disease has already developed so that blisters, loss of tissue etc., have occurred in some degree, the removal of cause (the burning lamp in this case) is not sufficient. The lamp has to be removed and burns also treated. That is both *hetu* and *vyadhi* should be dealt with.

(B) *Thadarthakari Chikitsa or Treatment by Homeopathy in the sense of treatment by similars.* This again is of three kinds namely; (1) *Hetu Thadarthakari* or treatment by measures which are similar to the cause (*Hetu*) and operate for its removal. (2) *Vyadhi Thadarthakari* or treatment by measures which are similar to *Vyadhi* (disease) and operate for its removal. (3) *Hetu-Vyadhi Thadarthakari* or treatment by measures similar to both *Hetu* (cause) and *Vyadhi* (Disease) and operate for their removal.

It will thus be seen that the classification given above is all-inclusive and valid for all times and provides ready-made niches or mansions, to which fitting welcome may be extended, as stated before, to any form of treatment of proven utility that may be known already (whether it bears the specific label Allopathy, Homeopathy, Naturopathy or any other) or that may become known hereafter. There are, of course, *practical limitations* arising from the varying and limited capacities of individuals to acquire a sufficient knowledge of other presentations and incorporate harmoniously into their practice such things as are of proven utility in other practices. We know from our own experience and practice that such harmonisation can be done according to the measure of our

individual capacity and opportunity. We know also of practitioners qualifying from Allopathic Colleges becoming votaries of Homeopathy, Naturopathy etc. later on and adopting them successfully in their practice.

THE GENERAL PRINCIPLES OF TREATMENT—TREATMENT TO BE BASED ON ACCURATE DIAGNOSIS AND PROGNOSIS

The general principles of treatment according to Ayurveda are indicated in the following extract from the written evidence of the late Kaviraj Dr. Gananatha Sen, one of the ablest and most successful practitioners of his day and a brilliant Sanskritist and Ayurvedic scholar learned in Western Medicine also: "The *sine qua non* of proper treatment is of course proper diagnosis particularly with a view to our 'Thridosha' pathology. This done, we have to ascertain whether we have to fight the intrinsic cause (*i.e.*, धातु वैषम्य) or the disease itself; also whether the case is Sadhya or easily curable, Krichchra Sadhya or curable with difficulty, or Asadhya or incurable. The last group of cases is either not treated at all or treated only to make the disease Yapya or tolerable.

SAMSODHANA AND SAMSHAMANA TREATMENT

" Now, let us first consider *the medical side of treatment.* First of all, we take note of the Samata (सामता) *i.e.,* presence or absence of auto-intoxication (or autogenous toxicity) in every disease. If auto-intoxication is present, we treat the patient by fasting, purging, etc., within the limits of the patient's strength and tolerance till the symptoms of auto-intoxication disappear. These symptoms have been stated very clearly in a general way as also in particular for different diseases. This line is called *samshodhan or " clearing-up " treatment.* As an example of this may be cited fasting or purging in some fevers as the first course of treatment. If there is no auto-intoxication, we treat the disease directly (*e.g.,* giving a febrifuge in fevers). This is called *Samshaman* or *" putting down treatment "* Both kinds of treatment are of course done with a clear grasp of the *doshic* derangement, the removal of which is considered the ultimate goal of treatment.

PANCHAKARMA OF FIVE METHODS OF SAMSHODHANA TREATMENT

" In this connexion, it is worth while to mention that there are five methods (Panchakarma) of the

samshodhan or " clearing up " treatment. These are : (1) *Vamana* or the use of emetics for washing out the stomach. (2) *Virechan* or the use of purgatives with a view to clear the upper or lower bowels. Numerous purgatives have been described to suit various cases. (3) *Shiro-virechan* or the use of errhines to promote the nasal secretions—in diseases of the nose and throat generally, in some diseases of the eye (as glaucoma) and in some forms of intractable headache and cerebral diseases. (4) and (5) '*Asthapan*' *and* '*Anuvasan*,' known collectively as '*Vastikarma*' which comprise the various forms of enemata, known and unknown to the Western science. To enumerate some of these, we may mention—(i) *Shodhana vasti or Niruha*, made up of medicated alkaline fluids (Kashayas) for clearing out the colon. (ii) *Snehana vasti or anuvasan*, made up of similar fluid with copious oily substances in it—for clearing out the colon and soothing the pelvic nervous system. (iii) *Pichcha vasti*, mucilaginous enemata used as emollients to soothe the inflamed mucous membrane of the colon in colitis and other diseases. (iv) *Brihmana vasti*, or nutrient enemata used not only in extreme cases, where feeding by the mouth is not possible, but also in ill-nourished patients who can take by the mouth. (v) *Bheshaja vasti*, or

medicated enemata—similar to Bromide and Chloral injections in Western medicine. And so forth, hundreds of drugs and recipes are described for use under each of the heads above enumerated. So much indeed was the reliance in Vasti Karma in certain diseases that we read : वस्तिं चिकित्सार्धमिति ब्रुवन्ति । सर्वां चिकित्सामपि वस्तिमेके ॥ Enemata (Vasthi-karma) constitute half the treatment if not the whole treatment as some physicians think."

AYURVEDA AS AN ART

THE PAST AND THE PRESENT

In the palmy and progressive days of Ayurveda, the fathers of Ayurvedic Medicine were the foremost exponents and all-round practitioners of their times, teaching and practising Ashtanga Chikitsa, ' the eight divisioned therapy ', comprehending medical, surgical and other branches included in the term ' Ashtanga '. To those who are apt to judge the past of Ayurveda by the conditions of the present lack of self-sufficiency —especially in the Surgical field, a description of the striking achievements of the past even in the Surgical line as given in the Encyclopædia Brittanica (Vol. XXII —P. 672—9th Edition) may serve as a useful eye-opener. History has recorded that medical students from all parts of the world came for post-graduate study to the Medical Faculty of some famous University in India, as the one at Taxilla or Nalanda. The field of activity of our Physicians and Professors of those days was not confined to India but extended from Greece, Persia and Arabia in the West to China, Java

and other countries of Greater India in the East. Indian Professors and Practitioners of Ayurveda were then warmly welcomed by Royal Patrons in other countries. They practised under Royal Patronage and exchanged thoughts freely with practitioners of those countries. The treasures of Ayurveda were translated into the language of other countries—Persian, Arabic, Chinese, etc. : and a number of remedies of proven utility used by the Arabians, Persians and Chinese were incorporated into Ayurvedic Pharmacopoeia ; but, due to various causes—political and other which need not be gone into here, this palmy and progressive period was followed by dark and decadent days for Indian Medicine as for many other branches of the learning and wisdom of India. State-recognition and state-patronage was withdrawn from Indian Medicine and transferred to the Western Medicine of our Rulers. This led to stagnation, obstructed progress, stunted growth and partial functioning from the effects of which Indian Medicine is still suffering ; but, even under the severe handicaps it has been subjected to, it is Indian Medicine that is still ministering to large sections of our Public—especially the rural millions in whose hearts it still finds a place of grateful appreciation and abiding affection.

Examples are not wanting even in recent times to show how treatment of even new diseases could be successfully undertaken by practitioners of Ayurveda, by the application of their fundamental principles of Diagnosis and Treatment which have served them well through the ages. When virulent epidemics like plague and influenza first broke out in India some years ago, practitioners of Ayurveda were quite equal to the task of divising, on the basis of thridoshic pharmacology and therapeutics, new remedies which proved at least as successful as the remedies then devised by any other system of Medicine. " Haimadi Panakam " and " Shathadoutha Ghritham ", the remedies devised by the late Vaidyaratna Pt. D. Gopalacharlu for plague, were looked upon as specifics by the Public and used by a large number of practitioners, including Allopathists. Similar was the case with his " Charaka Vati " for influenza. It is not only in respect of new diseases that they have devised new remedies and methods of treatment. They have realised all along that even ancient diseases exhibit variations in their manifestations, from age to age, and country to country, as also in relation to changing conditions of individuals and their social and other environments ; and they have gone on taking due note of all these factors as they occurred and

adjusting remedies and diets appropriate to the changed and changing conditions.

Furthermore, it has to be noted that the ministrations of Indian Medicine are sought after not only by the vast masses of our unlettered poor whose faith, affection and preferences are rooted in Indian Medicine but also by well-placed persons of light and learning in all walks of life, including rich intellectuals who could well afford to obtain the services of Western Medicine if and when they want it as also by some practitioners of Western Medicine itself in the treatment of some of their patients and of the members of their family including themselves.

All realists have therefore to take note of the fact that the practical and survival value of Indian Medicine is decidedly high, as may be gathered from the fact that it is Indian Medicine that has ministered for millennia to the medical needs of the vast masses of our population and that, even to-day, and notwithstanding the very adverse conditions which it has been subjected to for over a century and a half, it is Indian Medicine that ministers to about *80 to 90 per cent of our teeming millions especially in rural areas whose faith, affection and preferences are rooted in Indian Medicine* while it is only 10 to 20 per cent of the population living mostly in Urban Areas that are

served by Allopathic Medicine, notwithstanding the fact that, for over a century and a half, it has enjoyed almost exclusive monopoly of State-patronage, State-support and State-munificence. Under these circumstances, it was a disservice to the cause of both Science and suffering humanity that previous Governments should have ignored or discouraged an agency with such proven practical and survival value as that of Indian Medicine. This mistake has now to be set right and that as quickly as possible.

The Science and Art of Indian Medicine is part and parcel of our invaluable cultural heritage which should be zealously preserved, fostered and promoted at least in India and for the greater service to the cause of Science, suffering humanity and the generations that are to come after us. If it is ignored in India itself, where else could we expect it to be cherished as the Science and Art of such proven practical and cultural value deserves to be cherished.

NUTRITION, SICK-DIETING AND DOMESTIC MEDICINE

In his Presidential Address to the Association of Physicians of India about four years ago, Dr. Jeevaraj N. Mehta observed as follows in regard to nutrition and Dietetics :—The subject of nutrition has been, for

several years, the concern of most countries in the world. . . . We are still very far from evolving an Indian dietary on modern scientific basis. . . Though modern scientific medicine has been with us for over a hundred years, we have not yet evolved dietary suitable for those with vegetarian habits, either in acute illness or during the stage of convalescence ". If modern medical science has not yet been able to solve the problems stated above, during these hundred years or more, will the votaries of modern medicine condescend to examine whether the ancient Medicine of Ayurveda has anything to contribute to the solution of the said problems ? If they take the trouble to acquaint themselves with the texts and traditions on the subject of "Pathyapathya", they will find that the dietaries suitable—(Pathya) and un-suitable (Apathya) for each disease and for various stages of the disease have been worked out. So too there are texts and traditions relating to the subject of Nutrition and the properties of the articles of foods and drinks in common use in India. The approach to the subject is, however, somewhat different. It is on the assumption that a living human being is not merely a material entity but essentially a spiritual being so that the problem of his nutrition is not merely a question of physics and chemistry, of

calories and vitamins—natural or synthetic (important as these are) but also a question of psychological and spiritual values and of providing nutrition suitable not only for his physical body but for his emotional and mental bodies as well. There is a very close interdependence of the nutrition of these several bodies—specially in the case of intellectuals, scientists, poets, philosophers, mystics, statesmen and people in general with outstanding qualities of head and heart as distinguished from people whose work is symbolised by the hand such as manual labourers and other similar workers. The nutritional needs of all these have to be considered separately and individually. The close interdependence and interaction of the physical and other bodies of living human beings will be dealt with later on under the head of Health-Culture. Practitioners of Allopathy who are really interested in studying Ayurvedic texts and traditions on this question may however find it difficult to get at the original sources because they are written in Sanskrit or vernaculars with which they are not acquainted and also because the information required is scattered over many books so that reference to a single work will not be sufficient to give full information in every case. I think it is our duty to render all the help we can to genuine enquirers. The best way of doing this

is to arrange for the compilation and publication of treatises in which knowledge found in many sources is gathered into the compass of a single comprehensive work. Similar remarks apply to the question of compiling treatises on Grihavaidyam (the subject of house-hold remedies and preparation of diets in health and illness) a working knowledge of which was well known to our grand-mothers, less known to our mothers and least known or not known at all to our sisters and daughters.

HEALTH-EDUCATION AND HEALTH-CULTURE

Study and research concerning the cause and cure of diseases, the prevention of ill-health and promotion of health are doubless essential in order that our knowledge in regard to these topics may grow from more to more ; but it is also essential that methods should be devised whereby a portion of such knowledge as is necessary is communicated to each individual in the community in order that he may make it his own and co-operate intelligently in carrying out measures intended to prevent diseases and promote health. If we are to profit by the experiences of the west in this repect, we have to realise that the programmes of Health-lectures, Health-demonstrations,

Health-films and other forms of propaganda carried on till now have proved insufficient for achieving the supreme objective of all Health culture, *viz.*, the formation of the *right habit*—the health habit if you please—which would enable a person *to behave habitually correctly* under all circumstances, to follow hygienic ways and avoid unhygienic ones as a matter of unconscious or automatic behaviour, exactly as a properly educated gentleman would act correctly and behave gentlemanly under all circumstances merely as a matter of right habit (resulting from right training) and without any need to think in each case whether it is correct to sit in one way or in another. The ideas in my mind in regard to the causes of the present unsatisfactory situation and the way to deal with them are so well expressed in an Article by Dr. Atkinson, former Commissioner of Health for Western Australia that I beg leave to give below a summary of his article using his own words as far as possible: The results of the present-day methods are appallingly slow; the ignorance of the general public in regard to even the simplest principles of Hygiene is still colossal. *If we have succeeded in imparting the knowledge, we have not succeeded in persuading the great majority of Individuals to apply it.* If facts are pushed before

them, they wake up temporarily and take notice, but tend to forget readily and fall back into ignorance. Our literature pushed under the noses, is casually read and thrown away. Our lectures are attended by the few and for the most part by those already so instructed in the subject as not to need them. Our lantern slides are viewed out of curiosity; and if amusing are appreciated for the laughs they invoke rather than for the message they convey. And so, much of our time is wasted. It is all so temporary in its effect and so casual and infrequent in its presentation. It does not arouse permanent interest nor retention. In other words it does not stick. Now the question is to consider what it is that has led to this unsatisfactory result. The answer is that it is because we approach the question in the wrong way, in that we endeavour to teach it as we would a science, academically, instead of trying to develop it as a sense, the Public Health sense if you like, a sense of right and healthful communal and individual living. Now, how may this sense be developed? The answer is that it *must originate with first impressions very early in life*. If the parents themselves had this public health sense and knowledge developed from their infancy, they would unwittingly develop it in their offspring. The imitative infant watching its

mother convey food to the mouth might equally well watch her drive away the flies from milk-jug and cover the jug. During this infant stage, the teachers of the very young can do a lot through stories, nursery rhymes and the like. Why not invent stories with a definite health-value, stories that will, whilst being of a nature to hold the child's interest and remain in his memory, convey real facts and principles of value in later life. What an opportunity we are missing ! Just think how tellingly one might describe the adventures of a ghoulish fly which laid its eggs in the manure heap of the palace stable ; how out of these eggs came a legion of other ghoulish flies intent upon slaying the princess' baby ; how they fed upon filth which they carried to the golden cradle and with which they contaminated the baby's lips. The baby thereupon sickens and the distracted princess calls for a knight who will go forth and swat all flies or better still destroy all fly-breeding manure heaps ; and then, think too, of the illustrations that may accompany this story and help to keep the moral alive for evermore ; so too, think of the nursery rhymes ; what an opportunity to hash up our hygiene in never-to-be-forgotten forms.

If we wish to see that every individual has his health-sense so well trained that living and reacting

hygienically under all circumstances is with him a matter of unconscious behaviour and that his pursuit of hygienic acts and avoidance of unhygienic ones are both done as a matter of correct habit, then, it is necessary to *begin health-education and health-training right from the very commencement of infancy through nursery rhymes and songs for little children; through poetical or musical recitations, memory-aiding jingles and interesting stories for the children at the primary school stage; through themes in dramas, poetry, prose, music, painting, cinemas, etc., for adolescents, aided in all cases by right examples of parents, guardians, teachers and others who may serve as examples.* The fundamental idea should be that in every case health-knowledge should be presented in a manner which is interesting enough to grip the attention of the child and make a lasting impression on his memory; it should be unobstrusive yet persistent; not occasional, academical lessons chilling to the child and divorced from his life-activities but regular events of his daily routine *both at home and at school*, so planned that by constant practice the child acquires the HABIT of right living as a joyous and almost unconscious function of life-activity. It should be quite a feasible programme to revive the ancient nursery rhymes and songs, stories

and ballads, the Aharavihara Vidhis and the like in a manner that are suited to modern conditions; we have excellent models as, for instance, in the chapters on Dinacharya (rules of daily conduct), Ritucharya (rules for the different seasons) and the like, which are found in all ancient books on Medicine, not to speak of the wise sayings scattered in many other sastraic works, specially the Grihya sutras and Dharma Shastras such as those of Manu, Yajnavalkya and Parasara. There are certain unique excellences in our ancient models which, one would very much wish, modern medicine may follow with advantage. The ancients loved to express themselves through verses which were at once classic works of mellifluous poetry as well as standard works of medical science, with the result that their appeal was lasting and widespread; the verses were easily and eagerly committed to memory and treasured up as permanent possessions not only by the students of medicine but by many others as well. Another and a most precious feature of our ancient health-maxims lies in the very strong emphasis that is laid everywhere on the profound truth that the health of the body is very closely interrelated with the health of the emotions and the mind and that, therefore, it is as vitally necessary to provide the latter with Ahara

(food) and Vihara (practices) that they need as it is necessary to provide the physical body with the food and practices it needs. Time there was, and that not long ago, when it was the fashion to hold up to ridicule the ancient Ayurvedic teaching that certain emotions like anger, sorrow, fear, hatred, jealousy, etc., would make for ill-health while certain others like affection, charity, contentment, compassion, joy, etc., would make for good-health. This was ridiculed as an evidence of the incurable habit of our ancients to go about mixing up scientific laws with rules of ethics on the one hand and superstitious beliefs on the other. Fortunately for all concerned, the times are now fast changing and the discoveries of modern science itself are seen to confirm the ancient teaching. Modern science seems now to be prepared to explain that with every fit of anger, rage etc., there will be a corresponding unhealthy stimulation of the adrenal or other glands which, if frequently repeated, may lead to such exhaustion of the affected glands as to result in, say, Diabetes, Neurasthenia, Dyspepsia etc. Modern science seems to be prepared to look for even *epidemics of emotional disorders* similar to epidemics of physical disorders, for instance, in the statement of an American doctor that " when stocks go down in New York, diabetes goes up ". It will

perhaps be explained that widespread financial crash results in widespread emotional crash of a specific nature which in turn leads to a correspondingly widespread pancreatic bankruptcy, resulting in an epidemic of diabetes. Far from ridiculing the ancients as persons who knew no better than to mix up health and ill-health with the practice and non-practice of the social and moral virtues, modern science itself may well be prepared to preach an "ethical" sermon, somewhat in the following strain: "If you habitually allow yourself to get into fits of anger or rage the result will be, among other things, unhealthy stimulation of your adrenal glands, leading perhaps to neurasthenia. If you habitually get into temper as often as you can, you will surely have to pay the penalty for it in the shape of dyspepsia and such other troubles. If on the contrary you are ever affectionate and cheerful, radiating sunshine wherever you go, you may safely trust to your own glands—both the ductless and the ducted, to keep you ever young and in radiant health. In brief, judged even from the most materialistic standpoint of sheer physical well-being it will pay you exceedingly well to practise altruism, sobriety, cheerfulness, affection and other social and moral virtues, while avoiding like poison, passion, hatred, jealousy, anger, rage and other vices.

Go about doing good, avoiding evil, and practising Sadachara (right social and moral conduct) as Nithya-karma and I promise you the very best of health and therefore of happiness." Thinking along such lines, it should not now be difficult for us to appreciate in our own measure the profound wisdom of the great Rishis of this ancient land who, in laying down precepts of our daily practice (Nithyakarma and Dinacharya), have ever proclaimed that what is essential for a healthy life is, first of all and most of all, to live nobly, to think clean thoughts, to feel noble emotions and to behave rightly under all the varying conditions and circumstances of our lives. It is good to have clean bodies; but clean minds are even more essential. It is good to keep our body clean and feed it on pure food; but, it is better to take our food after a cleansing bath and with clean minds and pure hearts. Such is the ancient teaching which Ayurveda has ever proclaimed. Our great forefathers attached so much importance to the observance of rules of hygienic living as part of our daily routine that they incorporated them into rules of Sadachara or the Nithya Vidhi which it was incumbent upon everyone to carry out every day and throughout the day. These hygienic rules of Sadachara or right conduct meet us everywhere—in the Srutis and Smritis

and Dharma Sastras, Ithihasas, Puranas, Medical and other scientific treatises, Popular songs, Kavyas, Natakas and Literature in general, as though they desired that everybody should become drilled in the habit of healthy living, no matter what his special study or avocation may be. We have now to re-edit the ancient rules of Sadachara laid down for the conditions which obtained in the spacious and leisurely days of old with its peculiar social, religious, economic and other environments so as to adapt them to the much altered conditions of the rural and urban lives of our modern days.

IS AYURVEDA SELF-SUFFICIENT AT PRESENT?

While the immense popularity and practical efficiency of Ayurvedic practice in the Medical line are of undeniably high value as are also the Ayurvedic writings and traditions in regard to Health-culture, Dieting, Domestic Medicine, Nutrition, etc., it does not appear that Ayurveda is self-sufficient in the surgical line as practised at present (*i.e.*, twenty-five years ago when this Memorandum was first written): Such is the opinion of a scholarly exponent and successful practitioner recognised as an eminent authority on Ayurveda, the late Kaviraj Dr. Gana Natha Sen

who has referred to this aspect of the question in the following terms: "Whatever may have been the past glory of Ayurveda it would be self-deception on our part to think that we still sit on a high pedestal. The number of Ayurvedic physicians in India is legion but soundly educated exponents of the ancient system are not numerous. Besides, there is yet a good deal of conservatism, which is contrary to the liberal spirit of Ayurveda which must be overcome. Much of the old valuable literature has been lost and what exists is not often studied in a scientific spirit. If the sound principles and methods of treating diseases with the time-honoured recipes of reliable efficacy were not there, the Ayurvedic system of medicine would have been dead by this time in the struggle for existence. So, let us not be slow in recognizing the crying need for reform. We may have once made great progress in Surgery but we must confess that we now lag sadly behind. . . . And even in the great departments of Medicine and Pharmacy which are our great pride and mainstay, we must work hard to demonstrate and utilize the principles of medicine that we have in our books. One may therefore be permitted to suggest that it is not in the interests of the public, the promotion of whose well-being must alone be our

paramount consideration, to shut out *any* useful means of medical, surgical or other relief, no matter whether it is of the European or of any other denomination."

THE SHORT-RANGE OBJECTIVE—TRANSITION TO THE SYNTHESIS OF INDIAN AND WESTERN MEDICINE

It is on the basis of opinions such as those noted above that the Madras Government Committee on the Indigenous Systems of Medicine observed as follows in their Report published early in 1923 : " It seems to us that the first and foremost problem that we have to address ourselves is to see how we can make the Indian systems of medicine rapidly self-sufficient and fully efficient ; for, unless and until this is secured, the problem of bringing adequate medical relief within the easy reach of our masses, especially, in the rural areas, will not become satisfactorily solved. Moreover, the establishment of institutions of Indian systems will, under these circumstances, remain a proposition of only limited applicability ; because it would involve the maintenance of *a double set of institutions, one, the Indian, to look after our medical ailments, and the other the European, to look after our surgical needs—an arrangement as uneconomical as it is unsatisfactory*. Some such arrangement may, however,

become inevitable in the *transitional stage* ; but this period should be as short as possible. We, therefore, consider, that the most urgent and immediate concern for the State is to establish and also to promote, by State-aid, State-recognition, and such other means, the establishment of suitable centres of medical education, and the devising of suitable scheme of studies of Indian medicine calculated to make those trained under it equal to the task of ministering, not only to our medical needs, as at present, but to our surgical ailments as well. Consistently with this view, we would like to see the future practitioners of India, no matter what denomination they belong to—Ayurveda, Siddha, Unani, European medicine or any other—being so schooled and trained, as to be able to bring to bear on the problem of health and ill-health, not only the expert knowledge of their systems, but, as far as practicable, the best that is in other systems also."

THE LONG-RANGE OR ULTIMATE OBJECTIVE—THE SYNTHESIS OF INDIAN AND WESTERN MEDICINE INTO A UNIFIED AND INTEGRATED WHOLE

It is to implement the short-range objective noted above, that I have pleaded frequently that a working

knowledge of Indian Medicine is to be acquired by the students of Western Medicine and a working knowledge of Western Medicine is to be acquired by the students of Indian Medicine through two types of institutions in both of which there would be provision for training in both Indian and Western Medicine but with emphasis on Indian Medicine in the one type and on Western Medicine in the other ; but this, I have always stated, was to be deemed as only a temporary and transitory arrangement. The long-range or ultimate objective should be the synthesis of Indian and Western Medicine into a unified and integrated whole. We should keep ourselves constantly uptodate and in continual touch with current scientific thought and achievements of proven utility, arranging our courses of study in such a way as to enable those trained under it to prove equal to the task of serving the country successfully, efficiently and with distinction in all fields whether it be Medical Relief or Medical Education or Medical Research. This should be easy and natural for us ; for, it has been the unique feature of Indian culture throughout the ages that while it has gone on assimilating the valuable and significant features of other cultures, it has all the time remained fundamentally rooted in its own cultural excellences. It is because of this feature

that Greeko-Arabian or Western Medicine of yesterday which we call Unani has now been assimilated into and become part and parcel of Indian Medicine of to-day. Working along similar lines, we may confidently hope that Allopathy, the Western Medicine of to-day, will likewise get assimilated into and become part and parcel of Indian Medicine of to-morrow.

THE UNIVERSAL BROTHERHOOD OF HEALERS

I have been and am still a student of Western Science; and I feel I owe it more than I can tell. I feel also that the more one studies modern Science and modern Medicine, the more one begins to appreciate the immense value to the world of thought generally of the foundational tenets of Indian Medicine such, for example, as its views on Matter, on Mind, on Prana and on its Thridosha Physiology, Pathology and the methods of treatment based thereon and on its conception of Health-education and Health-culture. It is after such comparative study that one feels like adapting to the present topic the well-known saying: "Who knows of England who only England knows" and saying to oneself "Who knows of Indian Medicine, who only Indian Medicine knows." I am also one of those who believe that it is not by a

mere accident that Indian Medicine and Western Medicine have come into contact with each other, but that the contact is part of the plan of that Great Power which "sweetly and mightily ordereth all things" and is designed to achieve the enrichment of our Medical and cultural heritage by assimilation of the valuable features of Western Medicine and of related Western culture. I hopefully look forward for a day and that, at no distant date, when Indian Medicine will not only become self-sufficient in all its eight departments as of old but will also so influence the world of Medicine generally as to enable others to enrich their own Science and serve their own people better than they could otherwise do and when the existing problem of "rival" systems would cease and there comes into being a Healers' Brotherhood and Scientific Union in which the present-day warring elements would cease from their quarrellings and meet as friends, colleagues and brothers-in-science-and-service.

ORGANIZATION OF MEDICAL RESEARCH

As Part of an integrated Whole of which Medical Education and Medical Relief are the other Parts

Medical Research thrives best when it is organized as a vital part of one integrated whole of which

Medical Education and Medical Relief are the other equally vital parts. It is also the most efficient method for ensuring the best care for our patients and the best training for our students. Where work is carried on in such a way that the Teachers, Research staff, Clinicians and Laboratory workers are research-minded all the time and the students are trained for a period of not less than four to five years in an atmosphere charged with such research-mindedness coupled with the most careful, devoted and sympathetic attention to the sick and suffering, it may well be expected that research-mindedness of the right type will become a habit—a second nature—with them and animate their work for the rest of their lives. This much-desired result will be brought about more as a matter of unconscious and automatic activity than as a conscious and laboured effort at every step. It is when such reform is effected that we may reasonably expect to find Medical Research in this country assuming its proper role, freeing itself from the charge levelled against it by the Bhore Committee when they observed as follows in regard to Medical Research—or rather the talk of it—in our Country :—

"In Western Countries, Medical Research is undertaken chiefly in the various departments of the Universities, Medical Colleges and teaching Hospitals.

Research is, in fact, an almost universal activity in such institutions and is regarded as a normal function. . . . . Broadly speaking, Medical Research received little or no attention in the Medical Colleges of India. . . . In his evidence, Prof. A. V. Hill, Secretary of the Royal Society, said that in the Medical Colleges which he had visited since coming to India, research was almost non-existent." Reverting to the same topic they again observe "The outstanding defect at the present time is the almost complete absence of organised Medical Research in the various departments of the Medical Colleges. It is true to say that, apart from a few noteworthy exceptions, Research in these institutions has been very badly neglected."

Prohibition of Private Practice

The *sine qua non* for Medical Research, Medical Education and Medical Relief to be so carried out as to produce the best results is the implementation of one of the vital and fundamental recommendations contained in the following observations of the Bhore Committee; "Whole-time salaried doctors employed by the State should be prohibited private practice. In our scheme the same doctor will combine in

himself, at the periphery, curative and preventive health functions and it seems almost certain that, without the prohibition of private practice, his preventive duties will not receive the attention they require. As regards medical relief, there was a general agreement among those whom we interviewed that prohibition of private practice was essential in order to ensure that the poor man in the rural areas received equal attention with his richer neighbour ".

CLINICAL RESEARCH

Examples are not wanting even in recent times to show how treatment of even new diseases could be successfully undertaken by practitioners of Ayurveda by the application of those fundamental Principles of Treatment that have served them exceedingly well throughout the ages. When virulent epidemics like plague and influenza first broke out in India some years ago, practitioners of Ayurveda were quite equal to the task of devising, on the basis of thridoshic pharmacology and therapeutics, new remedies which proved at least as successful as the remedies then devised by any other system of Medicine. " Haimadi Panakam " and " Shathadoutha Ghritham ", the remedies devised by the late Vaidyaratna Pt. D. Gopalacharlu

for plague, were looked upon as specifics by the Public and used by a large number of practitioners, including Allopathists. Similar was the case with his "Charaka Vati" for influenza. It is not only in respect of new diseases that they have devised new remedies and methods of treatment. They have also realised that even ancient diseases exhibit variations in their manifestations, from age to age, and country to country, as also in relation to changing conditions of individuals and their social and other environments. They have gone taking note of all these factors as they occurred and adjusted remedies and diets appropriate to the changed and changing conditions. We have to pick out from the very large number of reputed drugs, diets and remedies which texts and traditions prescribe for each disease, those which are found by Clinical Research to work most satisfactorily under conditions of the present generation. For Research in these fields, it is necessary to gather clinical data on a sufficiently large scale and check up results. It is desirable that such Research into the reputed values of the recipes and methods of treatment (including dietetics) followed in Indian Medicine is carried on in institutions where there are facilities for a hearty co-operation between practitioners of Indian and Western Medicine. The

actual treatment should be left to practitioners of Indian Medicine while specially selected Allopathists (qualified in Indian Medicine also if available) should collaborate as Medical Registrars and maintain careful, detailed and accurate records of the Clinical features, diagnosis, treatment and daily progress of all cases treated in the Clinics and publish the results in such language as would enable the followers of Western Medicine also to benefit from them, if they wish to.

PHARMACOLOGICAL RESEARCH

Clinical Research will also serve as a valuable guide in fixing our programme of Pharmacological Research by helping us to pick out, from the large number of reputed drugs and remedies which texts and traditions prescribe for each disease, just those which have been found by Clinical Research to work satisfactorily under conditions of the present day and to be suitable to the constitution of our present generation. Chemical and Pharmacological Research may then fruitfully concern itself with such selected drugs and recipes instead of working, as is done at present, with drugs selected at random from the bewilderingly large number of drugs and recipes enshrined in texts and traditions in relation to the

diverse conditions and constitutions of many generations that preceded us as well as our own.

RESEARCH IN IATRO-CHEMISTRY

Then, too, there is the wholly unchartered field rich in treasures of Iatro-Chemistry—Bhasmams, Sindurams, Churnams, Kattu, Khusthai and the like used by Ayurvedic, Siddha and Unani Practitioners. Who would not like to know, for instance, what it is that makes Chandrodayam or Makaradhavajam, the Rasayanam and Amritam that it is, while its chemical equivalent, Sulphide of Mercury does not find even a passing mention in our official Allopathic Pharmocopoea? Chemical, Bio-chemical and Pharmocological Research may well start investigations in these wholly unchartered and most fascinating fields of enquiry; but, these may not be sufficient to unveil the hidden secrets. It may well be that the pharmaceutical processes of Indian Medicine effect the transformation by bringing about some subtle and as yet mysterious changes in the Ultra-Chemical, the atomic or Nuclear regions or levels of Modern Physics. If so, it should be within the powers of those master-minds of Science who have devised wonderful experimental methods to explore the hitherto unchartered regions

of Nuclear Physics and even the course of the elusive and mysterious cosmic rays—it should not be difficult for such great scientists, to devise methods for revealing to us the plans and designs, orientations, lattice arrangements etc., according to which a life-giving Rasayanam like Purnachandrodayam is created out of such common clay like Sulphide of Mercury and incidentally, to give a glimpse, however faint, into the mind of The Great Architect of the Universe where, according to the belief of many students of our Ancient Wisdom, immutable and unalterable Laws govern the building up of all kingdoms of Nature including the mineral to which Purnachandrodayam belongs.

THE PHYSICIAN OF THE FUTURE

I also desire to invite attention to one striking feature of Indian Medical studies which has always seemed to me to be supremely worth conserving. In modern times, there have been discussions in academical circles concerning the relative values of the study of Humanities and the study of Sciences. There is a tendency to envisage these studies as though they were ranged in opposite camps and fighting each other for supremacy. The ancient Indian

view has been to look upon these as complementary studies to be earnestly pursued by all aiming at cultural harmony and fullness. Hence it is that, in Indian Medicine, it has always been considered necessary that the training of the future physician should provide not only for the study of Medicine in all its branches so as to equip him with the capacity to have the proper expert orientation to the problems of health and ill-health but also for the study of the Humanities, the Classics, as will enable him to have the proper humanist-orientation to Life and its Vital human problems. In other words, the ancient scheme of studies was so ordered as to give to the world great physicians who were not only great scientists but also great humanists—a type of Physicians vividly pictured for moderners in the following description of "The Doctor of the Future" by a Western writer Dr. R. W. Wilson: "The Physician of the future will not, as is now usually assumed, be a Scientist of the Orthodox type, a man with the technic of Laboratories at his finger ends and with the aim in his mind of elucidating the phenomena of Life in terms of Chemistry or Physics. Rather, he will be a Humanist—a man with the widest possible knowledge of human nature and the deepest possible understanding of human motives. He will be a

cultured man, ripe in intellectual attainments, but not lacking in emotional sympathy, a lover of the Arts as well as a student of the Sciences."—This is, indeed, no more than a projection into the future, of that gracious figure of the past—the great Physician who was also the great friend, philosopher and guide of every one from prince to peasant who sought his efficient and loving care and never sought it in vain. Such was the gracious physician of the past that is gone as will also be the gracious physician of the future that is to come—learned in the Science, skilled in the Art, free from greed or covetousness, kindly and compassionate, the man of strong will, clean life, and pure heart, whose picture is portrayed for us in the following verse in Sanskrit :

गुरोरधीताखिलवैद्यविद्यः पीयूषपाणिः कुशलः क्रियासु ।
गतस्पृहो धैर्यधरः कृपालुः शुद्धोऽधिकारी भिषगीदृशः स्यात् ॥

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